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US ARMY NATICK LABORATORIES

ANTHROPOMETRIC SURVEY OF THE ARMED FORCES OF THE REPUBLIC OF VIETNAM

ROBERT M. WHITE
Anthropologist

Sponsored by

ADVANCED RESEARCH PROJECTS AGENCY
Washington, D. C.

OCTOBER 1964

NATICK, MASSACHUSETTS

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2. Anthropometry
3. Human engineering
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SYNOPSIS

An anthropometric survey of military personnel of the Republic of Vietnam was conducted between 28 May and 1 July 1963. The survey was sponsored by the Advanced Research Projects Agency, Washington, D. C., and was authorized by ARPA Order No. 267, Amendment No. 6, dated 8 May 1963.

Body measurements were obtained on a total series of 2,129 men consisting of 1,225 of the Army, 299 of the Navy, 301 of the Marine Corps, and 304 of the Air Force. Fifty-one measurements were made on each individual. The anthropometric data have been analyzed and are presented in this report in the form of statistical values.

It was found that the 50th percentile value for the stature of Vietnamese military personnel is equivalent to the 2nd percentile value for United States soldiers, while the 50th percentile value for the weight of Vietnamese is less than the 1st percentile value for United States soldiers. The average Vietnamese is about five inches shorter in stature and 43 pounds lighter in weight than the average United States soldier.

The results of the survey, which provide information on the body size of Vietnamese military personnel, may be utilized in the engineering design and sizing of clothing and equipment intended for use by the Armed Forces of the Republic of Vietnam.

ROBERT M. WHITE
Head, Anthropology Laboratory
U. S. Army Natick Laboratories

APPROVED:

DALE H. SIELING
Scientific Director

W. W. VAUGHAN
Brigadier General, USA
Commanding

1. INTRODUCTION

a. Purpose

Anthropometric data constitute a basic requisite for defining the elements of body size in the human engineering of man-equipment systems. Effective human engineering requires the use of data on the specific population for which the equipment is intended. Since no adequate data existed on the Republic of Vietnam Armed Forces, an anthropometric survey was conducted to collect data on the body dimensions of a large sample of this military population. Analyses of these data have made it possible to define the range and variation in body size to be expected in the military personnel of the Republic of Vietnam.

The results of this survey should be utilized in all areas of research and development where detailed knowledge of Vietnamese body size and proportions are necessary. Anthropometric data on Vietnamese military personnel are of primary application in the engineering design of military equipment for the Armed Forces. The further application of this information to problems of design, sizing and fit of military clothing and personal equipment will result in increased efficiency, performance and comfort. Data on the range and variation of body size in the user population thus may be employed in the improvement of size systems and tariffing in order to achieve increased logistic efficiency and economy of supply.

b. Summary

An anthropometric survey of military personnel of the Republic of Vietnam was carried out between 28 May and 1 July 1963. A total series of 2,129 men was measured, including 1,225 men of the Army, 299 men of the Navy, 301 men of the Marine Corps, and 304 men of the Air Force. Fifty-one measurements were made on each individual. The results of the survey, together with analyses of the data, are presented in this report.

The survey was sponsored by the Advanced Research Projects Agency (ARPA) of the United States Department of Defense. The data collection in the Republic of Vietnam was carried out under the authority of the Department of National Defense. The project was supported by the Combat Development and Test Center (CDTC), a joint United States - Vietnam research and development activity in Saigon. The survey was directed by Mr. Robert M. White, Head, Anthropology Laboratory, United States Army Natick Laboratories, Natick, Massachusetts. During his tour of duty in Vietnam, Mr. White was attached to the ARPA Research and Development Field Unit, the United States element of the Combat and Development Test Center in Saigon.

c. Acknowledgements

While the survey was planned and supervised by an American anthropologist, the collection of anthropometric data was performed entirely by Vietnamese personnel. Many individuals, both Vietnamese and American, contributed to the success of the anthropometric survey in the Republic of Vietnam.

The support of Colonel Bui Quang Trach, Director of the Combat Development and Test Center, Saigon, and members of his staff throughout the survey is gratefully acknowledged. Special thanks is extended to First Lieutenant Ninh Phuc Duat, who served as liaison and project officer throughout the survey; his efforts in handling the details of planning, scheduling, and liaison contributed significantly to the successful completion of the survey.

The interest and support of the American personnel of the ARPA Research and Development Field Unit, Saigon, were sincerely appreciated. Colonel Vito S. Pedone USAF, Director, and his staff were very helpful and understanding during all phases of the survey. Major David E. Grange, Jr., USA, assisted in the survey as the U. S. project officer and was extremely helpful in this capacity.

The anthropometric survey in the Republic of Vietnam could not have been carried out without the understanding and cooperation of the military commanders and their staffs who made available facilities at their installations and personnel under their command. The assistance of the commanding officers of the units sampled during the survey is gratefully acknowledged.

The outstanding performance of the Vietnamese enlisted personnel who worked on the measuring teams should be recognized. These individuals put in many hours of exacting and tedious measuring in order to collect the anthropometric data of the survey.

Thanks is expressed to Captain Pham Ngoc Toa, Chief of Technical Services, Office of the Surgeon General, for furnishing anthropometric data collected by the Army Medical Corps. The assistance of Captain Bui Huu Dao, Commanding Officer of the 10th Base Depot, and of Captain Nguyen Thuy Chau, of the Clothing Production Center, in making available Army Quartermaster Corps clothing issue and sizing data is acknowledged. Major Kenneth R. Ingold, USA, Quartermaster Advisor, also was very helpful during the survey.

The valuable assistance of personnel of the Computer Branch, U. S. Army Natick Laboratories, who accomplished the data processing and statistical computations is gratefully acknowledged.

Mr. Richard L. Burse and Specialist Fourth Class Thomas D. Murray, of the Anthropology Laboratory, were extremely helpful in checking the data and in the preparation of material for the final report; their efforts are sincerely appreciated.

2. PROCEDURES

a. Planning and Organization

Planning for the anthropometric survey of the Republic of Vietnam was carried out in Saigon at the end of May, 1963. The first consideration to be taken up was the size of the sample of men to be measured. It was estimated that a series of approximately 2,500 men would serve as an adequate sampling of the Vietnamese Armed Forces. In order to provide representation from all services in the Armed Forces, it was planned that a large sample would be drawn from the Army, with smaller samples from the Navy, Marine Corps and Air Force. In order to provide a cross-section within the large Army sample, it was proposed that Army personnel be drawn from at least two infantry divisions and the Army's airborne brigade, and also that a group of Army basic trainees be included.

During the planning for the survey, it was stipulated that men of all age groups would be included in order to cover the range of military personnel from young recruits to older veterans. It was also planned that enlisted men of all ranks would be measured.

With respect to the geographical distribution of personnel, it was determined that men from all parts of the Republic of Vietnam could be sampled at various military installations in or near Saigon. Consequently, it was proposed that Navy and Marine Corps personnel be measured at their respective headquarters in Saigon, while Air Force and Army Airborne personnel be measured at Tan Son Nhut Airfield, also in Saigon. It was planned that Army personnel of two infantry divisions would be processed at their respective installations at Bien Hoa and My Tho, and that Army recruits would be measured at a training center near Saigon.

An important aspect in planning the anthropometric survey of Vietnam was the provision that all of the measuring would be carried out by Vietnamese military personnel who would be trained and supervised by a qualified physical anthropologist. This procedure proved to be entirely satisfactory, not only since trained and experienced American personnel were not available, but also because the utilization of Vietnamese personnel had the advantage of operational convenience.

b. Measurements and Equipment

The initial step in setting up the measurement procedure was the selection of the body dimensions to be measured. A list of approximately fifty measurements was drawn up for consideration. After review, fifty-one measurements were agreed upon, including dimensions of all parts of the body: weight, body lengths, breadths and circumferences, together with selected measurements of the head and face, the hands and the feet. The measurements chosen fell into two general categories. Some of the measurements are those of primary use in the design, sizing and grading of clothing, while others are of importance in the design and sizing of military equipment from the standpoint of human engineering. The measurements are described in Section 4,a.

Following the choice of measurements to be taken, a data sheet was prepared for use in recording the background data and the measurements on each man. Although the data sheet was drawn up in English, a complete Vietnamese translation was provided. The data sheet was arranged so that the recorded information subsequently could be transferred to punched cards for use in data processing. The data sheet is reproduced as Appendix A.

Standard anthropometric instruments were used throughout the survey. Anthropometers (calibrated metal measuring rods, 2 meters long) were used to measure stature and various body lengths; the anthropometers also were utilized as large sliding calipers for body breadths and for measurements of some arm and leg segments. Body circumferences and surface measurements were taken with 2-meter steel tapes. Small sliding and spreading calipers were used for measurements of the head, face and hands. Foot length, instep length and foot breadth were measured on a special foot board, while heel breadth was taken with sliding calipers. Weight was taken on spring platform scales, calibrated in kilograms. All of the body dimensions were measured and recorded in the metric system, with the measurements taken to the nearest millimeter.

c. Measuring Teams

Three measuring teams of five men each were utilized during the anthropometric survey of Vietnam. Of the fifteen men, ten were Army Quartermaster personnel, while five were Marine Corps personnel.

Each measurer was provided with a recorder who wrote down the measurements called out by the measurer. The recorders were furnished by the installation where the measuring was carried out.

The basic measuring team consisted of five men: a team leader and four measurers. The team leader was responsible for filling in the background information on the data sheet and for recording weight; it was also his assigned duty to maintain an even flow of men through the measuring line. Each of the four measurers was responsible for taking a block of related measurements.

In order to increase the number of men measured during a working day, three measuring teams were used simultaneously. It was thus possible to operate three processing lines and effectively triple the number of men measured per day. On the average, about 165 men were measured per working day.

In order to simplify training and to increase operational efficiency, all measurements to be made with one instrument were grouped together on the data sheet. In this way any one measurer learned the use of only one type of instrument and was responsible for a block of related measurements. The fifty-one measurements, therefore, were divided into four groups or blocks, so that an individual would be measured by four measurers in turn as he progressed through the processing line. The instructions used in training the measurers are given in Appendix B; these instructions show the order of the measurements in accordance with the data sheet.

The training of the measurers was carried out by the anthropologist in charge of the survey. Initially, the measurers were briefed on the survey and their duties were explained. The anthropometric instruments were then demonstrated and their use described. Sketches illustrating the measurements and sample data sheets were distributed to the measurers so that they could become familiar with the measurements and the sequence in which they were to be taken. The measurers then practiced with the instruments by measuring each other. After becoming familiar with the use of the instruments, the measurers were drilled by repeatedly measuring the instructor and several test subjects in order to achieve consistency and reliability.

The measurement of Navy, Marine Corps and Air Force personnel was carried out under the personal supervision of the anthropologist in charge, while the measurement of Army personnel was supervised by Lieutenant Duat and Major Grange. Measuring techniques were frequently checked for accuracy and consistency.

d. Data Processing

Processing of the data from the anthropometric survey of Vietnam was accomplished by the Computer Branch, U. S. Army Natick Laboratories, Natick, Massachusetts. After coding the background information, all of the data were transferred from the data sheets to

punched cards. Four cards were required for the data on each man in the series.

The background information and the measurement data were checked by examination of print-outs from the punched cards in order to eliminate duplications and obvious errors. The data for each of the 51 measurements were checked by careful examinations of the ranges and frequency distributions.

Computations of statistical values for the anthropometric data were then carried out on a General Electric 225 digital computer. These computations were based upon the use of ungrouped whole centimeter values for the larger body measurements. In the case of the smaller measurements of the head, hands and feet, the data were grouped into five millimeter (.5 centimeter) intervals.

Most of the statistical values are reported as computed. In the case of the percentiles, however, a further check on the computed values was made by plotting percentile curves. In this method, the cumulative percentages from the frequency distribution of each measurement are plotted on probability scale graph paper and the points are connected by a smooth line or curve. The percentile values given in this report are those read from these smoothed curves. The percentile values shown in inches were obtained by multiplying the metric values by .3937.

3. DESCRIPTION OF THE SAMPLE

a. Introduction

Although the main purpose of the survey was to obtain data on the body sizes of Vietnamese military personnel, other kinds of background information were recorded so that the samples of men who were measured could be described and characterized. The background data which were recorded for each man included the following: name and serial number, location and date of measuring, birthplace and home, ethnic derivation, religion, age, military service, branch and unit, rank, military specialty or duty, and length of service.

b. Chronology of the Survey

The process of measuring military personnel in the Republic of Vietnam was carried out during the month of June, 1963, and was concluded on 1 July 1963. The chronological progress of the survey is shown in Table 3.1.

Table 3.1. Chronology

Dates	Location	Service	No. of Men
17-18 June 1963	Saigon	Navy	299
19-20 June 1963	Saigon	Marine Corps	301
21-22 June 1963	Saigon	Air Force	304
24-25 June 1963	Saigon	Army, Airborne Brig.	401
26-27 June 1963	My Tho	Army, 7th Inf. Div.	306
28-29 June 1963	Bien Hoa	Army, 5th Inf. Div.	303
1 July 1963	Quang Trung	Army, Basic Trainees	215
		Total	2,129

c. Locations of Measuring

Military personnel were measured at seven locations during the survey. Navy and Marine Corps personnel were measured at their respective installations in Saigon. The Air Force sample was measured at Tan Son Nhut Airfield in Saigon. Personnel of the Army Airborne Brigade also were measured at Tan Son Nhut. A sample of Army men from the 5th Infantry Division was measured at Bien Hoa, located about 25 kilometers northeast of Saigon, in Bien Hoa Province, while Army personnel of the 7th Infantry Division were measured at My Tho, about 70 kilometers southwest of Saigon, in Dinh Tuong Province. Finally, Army recruits were measured at the Quang Trung Basic Training Center, located near Saigon. A summary of the locations of measuring and the number of men measured at each is given in Table 3.2.

Table 3.2. Locations of Measuring

Location	Service	Unit	No. of Men	Percent
Saigon	Navy	Naval Hdqtrs	299	14.0
Saigon	Marine Corps	Marine Corps Hdqtrs	301	14.1
Saigon*	Air Force	Air Force	304	14.3
Saigon*	Army	Airborne Brigade	401	18.9
Bien Hoa	Army	5th Infantry Division	303	14.2
My Tho	Army	7th Infantry Division	306	14.4
Quang Trung	Army	Basic Training Center	215	10.1
		Total	2,129	100.0

*Tan Son Nhut Airfield

d. Background Information

(1) Age

The information on age for the series of men measured in Vietnam is summarized in Table 3.3, while the distribution of age is given in Table 3.4. The statistical terms of mean, standard deviation (S.D.) and coefficient of variation (V) are discussed in Section 4,c.

Mean age for the total series was 27.2 years, with a standard deviation of 5.7 years. While the range of age for the total series was 18 to 53 years, 24 percent were 21- and 22-year-old men, and 51 percent of the men were between 21 and 26 years of age. The sample of Navy men had the lowest mean age (24.9 years), while Marine Corps personnel averaged one year older (25.9 years). Thirty-three percent of the Navy men were in the 21-22 year age group, and 60 percent were between 21 and 26 years old, while 31 percent of the Marines were 21- and 22-year-old men, with 59 percent between 21 and 26. The Army sample had a mean age of 27.9 years. Twenty-three percent of Army men were in the 21-22 year age group, while 51 percent were between 21 and 26 years old. Mean age for the Air Force sample was 28.1 years; only 16 percent were in the 21-22 year age bracket, while 35 percent of Air Force personnel were between 21 and 26 years of age.

Table 3.3. Summary of Age

	Army	Navy	Marine Corps	Air Force	Total Series
Range (years)	18 - 53	18 - 47	19 - 46	19 - 44	18 - 53
Mean (years)	27.9	24.9	25.9	28.1	27.2
S.D. (years)	5.9	4.5	5.4	5.6	5.7
V (%)	21.0	18.2	21.0	19.8	21.0
Number of Men	1,225	299	301	304	2,129

Table 3.4. Distribution of Age

Age (years)	Army		Navy		Marine Corps		Air Force		Total Series	
	No.	%	No.	%	No.	%	No.	%	No.	%
18	2	0.2	1	0.3	-	-	-	-	3	0.1
19	9	0.7	10	3.3	7	2.3	6	2.0	32	1.5
20	23	1.9	29	9.7	27	9.0	23	7.6	102	4.8
21	184	15.0	41	13.8	34	11.3	29	9.5	288	13.5
22	99	8.1	58	19.4	58	19.3	19	6.2	234	11.0
23	92	7.5	38	12.8	34	11.3	18	5.9	182	8.5
24	88	7.2	15	5.0	16	5.3	9	3.0	128	6.0
25	62	5.1	13	4.3	19	6.3	10	3.3	104	4.9
26	98	8.0	15	5.0	16	5.3	22	7.2	151	7.1
27	51	4.2	14	4.7	13	4.3	17	5.6	95	4.5
28	53	4.3	13	4.3	6	2.0	13	4.3	85	4.0
29	42	3.4	14	4.7	9	3.0	18	5.9	83	3.9
30	54	4.4	9	3.0	8	2.7	33	10.9	104	4.9
31	56	4.6	5	1.7	9	3.0	13	4.3	83	3.9
32	48	3.9	8	2.7	6	2.0	12	3.9	74	3.5
33	50	4.1	2	0.7	12	4.0	16	5.3	80	3.8
34	36	2.9	2	0.7	5	1.7	12	3.9	55	2.6
35	29	2.4	3	1.0	3	1.0	9	3.0	44	2.1
36	37	3.0	2	0.7	4	1.3	6	2.0	49	2.3
37	33	2.7	-	-	1	0.3	5	1.6	39	1.8
38	23	1.9	1	0.3	1	0.3	3	1.0	28	1.3
39	19	1.5	1	0.3	6	2.0	4	1.3	30	1.4
40	8	0.6	4	1.3	2	0.7	2	0.7	16	0.7
41	8	0.6	-	-	-	-	2	0.7	10	0.5
42	4	0.3	-	-	1	0.3	1	0.3	6	0.3
43	7	0.6	-	-	2	0.7	1	0.3	10	0.5
44	2	0.2	-	-	-	-	1	0.3	3	0.1
45	3	0.2	-	-	1	0.3	-	-	4	0.2
46	1	0.1	-	-	1	0.3	-	-	2	0.1
47 -- 53	1	0.1	1	0.3	-	-	-	-	2	0.1
	1	0.1	-	-	-	-	-	-	1	0.05
Not Recorded	2	0.2	-	-	-	-	-	-	2	0.1
Total	1,225	100.0	299	100.0	301	100.0	304	100.0	2,129	100.0

(2) Geographical Distribution

Vietnam is a long, narrow country lying along the eastern coast of the Southeast Asian Peninsula, bordering the South China Sea. During the colonial domination of Indo-China by the French, Vietnam was administered in three parts: Tonkin in the north, Annam in the center, and Cochin China in the south. Under the terms of the Geneva Agreement of 1954, which ended the war with France, Vietnam was partitioned by a Demarkation Line near the 17th parallel. This division resulted in two distinct political entities: the Republic of Vietnam in the south, aligned with the Western powers, and the Democratic Republic of Vietnam, aligned with the Communist countries.

Since many personnel presently serving in the Armed Forces of the Republic of Vietnam were born in what is now North Vietnam, this discussion of geographical distribution will include the area and provinces of North Vietnam.

Five geographical regions may be distinguished in Vietnam: the Mekong Delta, the Central Highlands, the Central Lowlands, the Red River Delta, and the Northern Highlands.

The Mekong Delta area is a large, low, level plain built up by the five branches of the Mekong River and several smaller rivers. The area is very fertile and is the most densely populated region of South Vietnam. Saigon, the capital, is located in the center of the Mekong Delta area, about 50 miles from the Coast.

The Central Highlands consist of a plateau area in the western or inland part of South Vietnam. This plateau is essentially a southern extension of the Chaine Annamitique, which is a narrow and rugged mountain chain in the north, but which broadens into a generally flatter plateau area in South Vietnam.

The Central Lowlands form a narrow strip of coastal lowland, extending from the Mekong Delta in the south to the Red River Delta in the north. This area is bisected by the Demarkation Line near the 17th parallel.

The Red River Delta is an alluvial plain formed by the Red River system as it empties into the Gulf of Tonkin. Hanoi, the capital, and Haiphong, the chief seaport of North Vietnam, are located in this area.

The Northern Highlands consist of a rim of hills and mountains lying to the north and west of the Red River Delta in North Vietnam.

For convenience, the forty-one provinces of the Republic of Vietnam may be grouped on the basis of four geographical regions, which are shown in the outline map in Figure 1. The large Mekong Delta area may be divided into two regions: Mekong Delta - West, containing fourteen provinces, and Mekong Delta - East, comprising nine provinces. The province of Gia Dinh, including the capital of Saigon, is located in the center of the Mekong Delta area.

The Central Highlands region includes seven provinces, as well as the municipality of Dalat. The Central Lowlands region consists of ten provinces, together with the municipalities of Hue and Da Nang. The regions and provinces of the Republic of Vietnam are listed in Table 3.5.

The Democratic Republic of Vietnam, or North Vietnam, consists of twenty-seven provinces, two autonomous regions, and two small special zones. The two autonomous regions were established to recognize ethnic minorities in North Vietnam. The Viet Bac Autonomous Zone, which is divided into six provinces, is located in the northern part of North Vietnam, while the Thai-Meo Autonomous Zone, in the western part of the country, has no provincial subdivisions. There are eighteen provinces in the Red River Delta region and three provinces in the Lowlands area in the southern part of North Vietnam. The Hong Quang Special Zone is a small area near Hanoi on the Gulf of Tonkin, while the Vinh Linh Special Zone is a narrow strip of territory just north of the Demarkation Line. For purposes of discussing the birthplace of men born in North Vietnam, the Viet Bac and Thai-Meo Autonomous Regions may be considered North, the Red River Delta region is Central, and the Lowland provinces may be called South. The regions and provinces of North Vietnam are shown in Table 3.6.

According to reports based upon a 1960 census, the population of the Republic of Vietnam was 14,616,646. A census taken in North Vietnam in 1960 gives the population of that area as 15,916,955.

Vietnam has an average population density of 236 persons per square mile. Although about 10 percent of the people reside in urban areas, about 90 percent live on the 13 percent of the land which is best suited for rice cultivation - the two delta regions and the small river basins of the Central Lowlands. Portions of these areas have populations of over 2000 per square mile. Because of these heavy local concentrations, population density averages may be misleading.

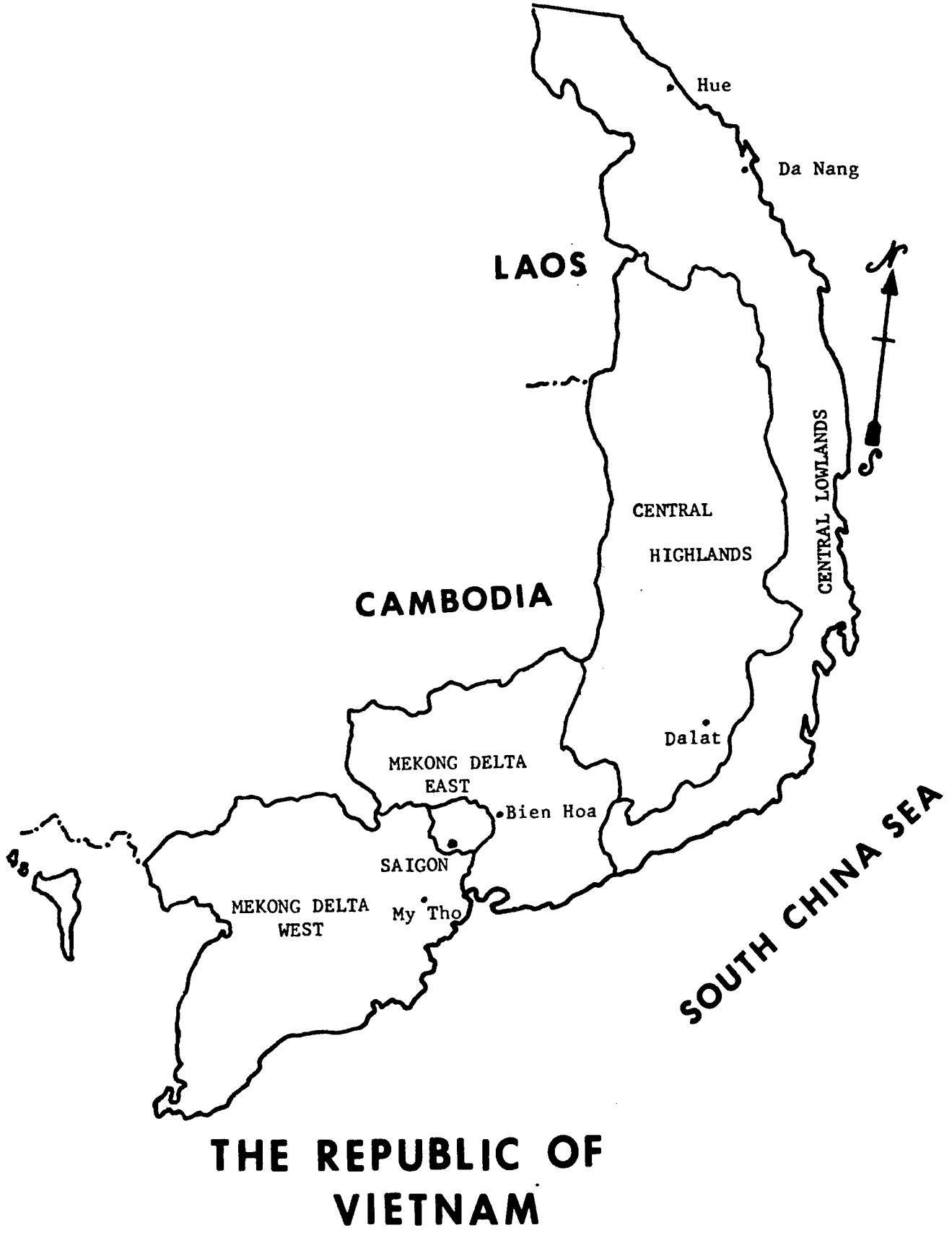


Figure 1. Provincial regions

Table 3.5. Regions and Provinces of the Republic of Vietnam

Mekong Delta - West (14)

Kien Giang
An Giang
Kien Phong
Kien Tuong
Long An
Dinh Tuong
Kien Hoa
Vinh Long
Vinh Binh
Phong Dinh
Chuong Thien
Ba Xuyen
An Xuyen
Con Son

Mekong Delta - East (9)

Tay Ninh
Binh Long
Phuoc Long
Binh Duong
Phuoc Thanh
Bien Hoa
Long Khanh
Binh Tuy
Phuoc Tuy

Gia Dinh Province

Saigon

Central Highlands (7)

Kontum
Pleiku
Phu Bon
Darlac
Quang Duc
Tuyen Duc
Lam Dong

Central Lowlands (10)

Quang Tri
Thua Thien
Quang Nam
Quang Tin
Quang Ngai
Binh Dinh
Phu Yen
Khanh Hoa
Ninh Thuan
Binh Thuan

Table 3.6. Regions and Provinces of North Vietnam

Viet Bac Autonomous Region (North)

Ha Giang
Cao Bang
Tuyen Quang
Bac Kan
Thai Nguyen
Lang Son

Thai-Meo Autonomous Region

No provinces

Red River Delta (Central)

Lao Kay
Yen Bay
Phu Tho
Son Tay
Vinh Phuc Yen
Bac Ninh
Bac Giang
Hai Ninh
Hai Duong
Hung Yen
Ha Dong
Hoa Binh
Ha Nam
Thai Binh
Kien An
Ninh Binh
Nam Dinh
Thanh Hoa

Hong Quang Special Zone

Hanoi

Central Lowlands (South)

Nghe An
Ha Tinh
Quang Binh

Vinh Linh Special Zone

While the population density in the Republic of Vietnam averages about 220 per square mile, the population is not evenly distributed. The Mekong Delta, with its fertile plains, has a density of 525 persons per square mile. In the Central Lowlands there is a great variation in population density, with higher concentrations of people in the fertile areas, and a sparse population in some of the infertile coastal strips. The plateau area of the Central Highlands is sparsely populated in general.

The population density of North Vietnam is about 262 per square mile, although there are great variations in the densities of various areas. The Red River Delta area, with an average density of 950 per square mile, is the region of highest population density in North Vietnam. Population is generally sparse in the Northern Highlands and in the narrow Chaine Annamitique mountain strip.

The geographical distribution of the series of men measured in Vietnam may be assessed by examining the data on birthplace and home which were recorded when the men were measured. Locations of birthplace and home were recorded by province rather than by city or town. As discussed above, the provinces of both South and North Vietnam have been grouped into regions. The geographical distribution of birthplace for the men of this survey is shown in Table 3.7.

A significant aspect of the anthropometric survey is the fact that while 67 percent of the men measured were born in South Vietnam, about 31 percent were born in what is now North Vietnam. About two percent were either foreign born (born outside of Vietnam) or their birthplace was not recorded.

In the total series, the largest number of men (29 percent) were born in the Central Lowlands provinces of South Vietnam. Approximately 21 percent were from the Mekong Delta - West provinces, and about 11 percent were born in Saigon or Gia Dinh province. Less than five percent were from the Mekong Delta - East area and less than one percent were from the Central Highlands, which is the area of sparsest population in South Vietnam. Almost 25 percent of the total series were born in the Central or Red River Delta region of North Vietnam, while smaller numbers of men came from the North, Hanoi or South areas.

The geographical distribution of birthplace for Army personnel is given in Table 3.8. Approximately 60 percent of the Army series were born in South Vietnam, while 37 percent were born in North Vietnam. Over 55 percent of the 7th Division men measured were originally from North Vietnam, while 42 percent were born in South Vietnam.

Table 3.7. Geographical Distribution of Birthplace for Total Series

Geographical Region	Army		Navy		Marine Corps		Air Force		Total Series	
	No.	%	No.	%	No.	%	No.	%	No.	%
South Vietnam:										
Delta West	209	17.1	83	27.7	81	26.9	81	26.6	454	21.3
Gia Dinh(Saigon)	57	4.6	52	17.4	41	13.6	83	27.3	233	10.9
Delta East	40	3.3	20	6.7	17	5.6	23	7.6	100	4.7
Highlands	9	0.7	2	0.7	5	1.7	-	-	16	0.8
Lowlands	428	34.9	64	21.4	89	29.6	37	12.2	618	29.0
Total	743	60.6	221	73.9	233	77.4	224	73.7	1421	66.7
North Vietnam:										
North	23	1.9	-	-	1	0.3	1	0.3	25	1.2
Central	375	30.6	54	18.1	51	17.0	46	15.1	526	24.7
Hanoi	34	2.8	12	4.0	7	2.3	21	6.9	74	3.5
South	22	1.8	7	2.3	9	3.0	6	2.0	44	2.0
Total	454	37.1	73	24.4	68	22.6	74	24.3	669	31.4
Foreign	6	0.5	3	1.0	-	-	3	1.0	12	0.6
Not Recorded	22	1.8	2	0.7	-	-	3	1.0	27	1.3
Total	1225	100.0	299	100.0	301	100.0	304	100.0	2129	100.0

Table 3.8. Geographical Distribution of Birthplace for Army Personnel

Geographical Region	Airborne No.	Airborne %	5th Div. No.	5th Div. %	7th Div. No.	7th Div. %	Trainees No.	Trainees %	Total Army No.	Total Army %
South Vietnam:										
Delta West	54	13.5	32	10.6	61	19.9	62	28.8	209	17.1
Gia Dinh(Saigon)	8	2.0	23	7.6	15	4.9	11	5.1	57	4.6
Delta East	-	-	8	2.6	13	4.3	19	8.8	40	3.3
Highlands	5	1.2	1	0.3	1	0.3	2	0.9	9	0.7
Lowlands	176	43.9	110	36.3	38	12.4	104	48.4	428	34.9
Total	243	60.6	174	57.4	128	41.8	198	92.0	743	60.6
North Vietnam:										
North	5	1.2	17	5.6	1	0.3	-	-	23	1.9
Central	124	31.0	90	29.7	155	50.7	6	2.8	375	30.6
Hanoi	12	3.0	12	4.0	9	2.9	1	0.5	34	2.8
South	8	2.0	5	1.7	5	1.6	4	1.9	22	1.8
Total	149	37.2	124	41.0	170	55.5	11	5.2	454	37.1
Foreign	2	0.5	1	0.3	2	0.7	1	0.5	6	0.5
Not Recorded	7	1.7	4	1.3	6	2.0	5	2.3	22	1.8
Total	401	100.0	303	100.0	306	100.0	215	100.0	1225	100.0

About 35 percent of the South Vietnamese in the Army series were from the Central Lowlands provinces and 17 percent were from the Delta West region. Most of the Army men (30 percent) born in North Vietnam were from the Central area of the Red River Delta.

During the survey in the Republic of Vietnam, the home provinces of the men measured also were recorded. It was intended that this would indicate the area of residence or "home" prior to the man's entry into military service. The geographical distribution of "home" is shown in Table 3.9.

Table 3.9. Distribution of Home

Geographical Region	Army		Navy		Marine Corps		Air Force		Total Series	
	No.	%	No.	%	No.	%	No.	%	No.	%
South Vietnam:										
Delta West	325	26.5	41	13.7	17	5.6	2	0.7	385	18.1
Gia Dinh(Saigon)	323	26.4	183	61.2	166	55.2	252	82.9	924	43.4
Delta East	485	39.6	16	5.4	77	25.6	20	6.6	598	28.1
Highlands	3	0.2	1	0.3	6	2.0	-	-	10	0.5
Lowlands	84	6.9	55	18.4	34	11.3	29	9.5	202	9.5
North Vietnam	-	-	2	0.7	1	0.3	-	-	3	0.1
Not Recorded	5	0.4	1	0.3	-	-	1	0.3	7	0.3
Total	1225	100.0	299	100.0	301	100.0	304	100.0	2129	100.0

In the listing of "home", 43 percent of the series are given as Saigon or Gia Dinh Province, with 28 percent as Delta East and 18 percent as Delta West. Since all of the military personnel were measured in or near the Saigon area, it is apparent that the listing of "home" probably refers to the area where the men are stationed, rather than to their home prior to entry into military service.

The correlation between region of birthplace and region of home may be seen in Table 3.10.

Table 3.10. Geographical Distribution of Birthplace and Home

Birthplace Region		Home Region											
		1	2	3	4	5	6	7	8	9	10	11	Total
1	Delta West	156	212	82	-	1	-	-	-	-	-	3	454
2	Gia Dinh	15	184	25	-	8	-	-	-	-	-	1	233
3	Delta East	14	47	37	1	1	-	-	-	-	-	-	100
4	Highlands	1	10	3	2	-	-	-	-	-	-	-	16
5	Lowlands	32	181	221	1	183	-	-	-	-	-	-	618
6	North	1	6	18	-	-	-	-	-	-	-	-	25
7	Central	143	199	174	2	6	-	2	-	-	-	-	526
8	Hanoi	9	41	21	2	1	-	-	-	-	-	-	74
9	South	5	25	9	2	2	-	-	-	1	-	-	44
10	Foreign	3	7	2	-	-	-	-	-	-	-	-	12
11	Not Recorded	6	12	6	-	-	-	-	-	-	-	3	27
	Total	385	924	598	10	202	--	2	--	1	--	7	2129

(3) Ethnic Derivation

At least 85 percent of the population of Vietnam are ethnically Vietnamese. Among the remainder of the population, the largest minorities are the Chinese, and the various indigenous highland groups known collectively as montagnards. Smaller numbers of Khmers and Chams also are found in Vietnam.

The ethnic derivations of the military personnel measured during the survey in Vietnam are shown in Table 3.11. Two-thirds of the Khmers in the Army sample were from the Airborne Brigade.

Most of the montagnards in the Army sample were 5th Infantry Division personnel. These men are Nung, one of the largest montagnard groups of North Vietnam. Although they are Tai speakers, and use a Central Tai dialect, they should not be confused with the people of Thailand, with whom they share a common language. It may be noted that large numbers of northern montagnards moved to the south after the partition of Vietnam in 1954.

Table 3.11. Ethnic Derivation

Ethnic Group	Army		Navy		Marine Corps		Air Force		Total Series	
	No.	%	No.	%	No.	%	No.	%	No.	%
Vietnamese	1082	88.2	297	99.4	273	90.7	304	100.0	1956	91.9
Chinese	19	1.6	1	0.3	5	1.7	-	-	25	1.2
Khmer	34	2.8	1	0.3	12	4.0	-	-	47	2.2
Cham	2	0.2	-	-	3	1.0	-	-	5	0.2
Montagnard	88	7.2	-	-	8	2.6	-	-	96	4.5
Total	1225	100.0	299	100.0	301	100.0	304	100.0	2129	100.0

(4) Religion

The leading religion in Vietnam is Buddhism. Mahayana Buddhism, the form which prevailed in China, predominates in Vietnam, but the Hinayana Buddhism of neighboring Cambodia and Laos also has some following in Vietnam. Confucianism and Taoism, also introduced from China, have some adherents in Vietnam. The number of Christians in Vietnam has been estimated at about 10 percent of the population, most of whom are Roman Catholics. The Cao Dai and Hoa Hao are politico-religious sects which developed locally in Vietnam. Cao Dai doctrine draws heavily on both Christianity and Buddhism, while the Hoa Hao sect is essentially a variant of Hinayana Buddhism.

The distribution of religion for the series of military personnel measured in Vietnam is shown in Table 3.12. In the total series, 69 percent were Buddhists and 25 percent were Roman Catholics, while other religious minorities made up the remaining six percent.

Table 3.12. Religion

Religion	Army		Navy		Marine Corps		Air Force		Total Series	
	No.	%	No.	%	No.	%	No.	%	No.	%
Buddhist	844	68.9	181	60.6	213	70.8	235	77.3	1473	69.2
R. Catholic	324	26.5	82	27.4	69	22.9	52	17.1	527	24.8
Protestant	2	0.2	4	1.3	4	1.3	4	1.3	14	0.6
Confucianist	11	0.9	23	7.7	1	0.3	5	1.6	40	1.9
Cao Dai	38	3.1	5	1.7	11	3.7	2	0.7	56	2.6
Hoa Hao	-	-	1	0.3	1	0.3	-	-	2	0.1
None	3	0.2	3	1.0	-	-	-	-	6	0.3
Unknown	3	0.2	-	-	2	0.7	6	2.0	11	0.5
Total	1225	100.0	299	100.0	301	100.0	304	100.0	2129	100.0

(5) Military Service

While current strength figures are not available, the estimated total strength of the Republic of Vietnam Armed Forces in 1962, based upon published accounts, was approximately 250,000. This represents about 1.7 percent of the total population of 14,620,000. The military establishment reportedly included the National Army of 170,000, the Navy of 8,000, the Air Force of 5,000 and the Civil Guard of 68,000. A program to strengthen all components was in progress and the Army was expected to increase to about 200,000 men by the end of 1962.

The series of military personnel measured during the anthropometric survey of Vietnam included representatives of the Army, Navy, Marine Corps and Air Force. The distribution of personnel by military service is shown in Table 3.13. The Army sample of 1,225 men, comprising 57.6 percent of the total series, consisted of personnel of the Airborne Brigade, of the 5th and 7th Infantry Divisions, and of basic trainees. The Navy sample of 299 men (14 percent of the total series) was made up of 251 men of the Regular Navy, together with 48 men of the Junk Force. The latter is a paramilitary organization of coastal junks, manned by former fishermen and utilized in patrol duties. The Marine Corps is an element of the Operating Forces of the Naval Command; 301 marines were

measured, representing 14.1 percent of the total series. The combined Navy and Marine Corps sample of 600 men comprised 28.1 percent of the total series. The Air Force sample of 304 men represented 14.3 percent of the total series.

The Army is the predominant service in the Armed Forces, representing over 90 percent, while the Navy and the Air Force each represent less than five percent of the Armed Forces. On this basis, the Army sample in the anthropometric survey (57.6 percent) was relatively small, while the Navy - Marine Corps (28.1 percent) and Air Force (14.3 percent) samples were relatively large in proportion to the sizes of the respective services.

It was requested that military personnel of all ages and ranks be measured during the survey. No specific selection of personnel was made in that all men made available by their commanding officers were measured.

Although information on branch of service, unit, and military specialty or duty was recorded for each man measured during the survey, these data have not been analyzed in detail and are not reported here.

Table 3.13. Distribution by Service

Service	Location	Number of Men	
		No.	%
Army:			
Airborne Brigade	Saigon	401	18.9
5th Infantry Division	Bien Hoa	303	14.2
7th Infantry Division	My Tho	306	14.4
Basic Trainees	Quang Trung	215	10.1
Total Army		1225	57.6
Navy:			
Regular Navy	Saigon	251	11.8
Junk Force	Saigon	48	2.2
Total Navy		299	14.0
Marine Corps	Saigon	301	14.1
Air Force	Saigon	304	14.3
Total Armed Forces		2129	100.0

(6) Rank

Two-thirds (67 percent) of the military personnel measured during the anthropometric survey of Vietnam were enlisted men, while 32.7 percent were non-commissioned officers (or petty officers). Only seven officers (0.3 percent) were measured; six of these were Air Force personnel and one was an Army Student Officer. A summary of these categories of rank is shown in Table 3.14.

Table 3.14. Summary of Rank

Category	Army		Navy		Marine Corps		Air Force		Total Series	
	No.	%	No.	%	No.	%	No.	%	No.	%
Officer	1	0.1	-	-	-	-	6	2.0	7	0.3
NCO	364	29.7	89	29.7	62	20.5	181	59.6	696	32.7
Enlisted	860	70.2	210	70.3	239	79.5	117	38.4	1426	67.0
Totals	1225	100.0	299	100.0	301	100.0	304	100.0	2129	100.0

The distribution of rank is given separately for the Army, Navy, Marine Corps and Air Force in Tables 3.15, 3.16, 3.17, and 3.18, respectively. In these tables the Vietnamese rank is given, followed by an approximate English translation of the term. For comparison the approximately equivalent United States Army, Navy, Marine Corps or Air Force ranks also are included.

In the Army sample, 18.3 percent were recruits or conscripts, while 51.9 percent were privates; thus 70 percent were enlisted men. The remaining 30 percent of the Army sample were non-commissioned officers. The Navy sample consisted of 70.3 percent seamen and 29.7 percent petty officers, while the Marine Corps sample included 79.5 percent privates and 20.5 percent non-commissioned officers. The Air Force sample was composed of 38.4 percent privates, 59.6 percent non-commissioned officers, and two percent officers.

Table 3.15. Republic of Vietnam Army Ranks

Vietnamese Rank	Translation	U.S. Army Equivalent		No.	%
Chuan Uy	Student Officer	Cadet		1	0.1
Thuong Si Nhat	Senior NCO 1st Class	Sergeant Major	(E9)	8	0.7
Thuong Si	Senior NCO	Master Sergeant	(E8)	15	1.2
Trung Si Nhat	Intermediate NCO 1st Class	Sergeant 1st Class	(E7)	33	2.7
Trung Si	Intermediate NCO	Staff Sergeant	(E6)	96	7.8
Ha Si Nhat	Junior NCO 1st Class	Sergeant	(E5)	48	3.9
Ha Si	Junior NCO	Corporal	(E4)	164	13.4
Binh Nhat	Private 1st Class	Private 1st Class	(E3)	149	12.2
Binh Nhi	Private 2nd Class	Private	(E2)	486	39.7
Binh Nhi Quan Dich	Recruit	Recruit	(E1)	20	1.6
Tan Bin Quan Dich	Conscript	None		205	16.7
		Total		1225	100.0

Table 3.16. Republic of Vietnam Navy Ranks

Vietnamese Rank	Translation	U.S.Navy Equivalent		No.	%
Thuong Si Nhat	Senior P.O. 1st Class	Master C.P.O.	(E9)	-	-
Thuong Si	Senior P.O.	Senior C.P.O.	(E8)	3	1.0
Trung Si Nhat	Intermediate P.O. 1st Class	Chief P.O.	(E7)	7	2.3
Trung Si	Intermediate P.O.	P.O. 1st Class	(E6)	38	12.7
Ha Si Nhat	Junior P.O. 1st Class	P.O. 2nd Class	(E5)	20	6.7
Ha Si	Junior P.O.	P.O. 3rd Class	(E4)	21	7.0
Thuy Thu I	Seaman 1st Class	Seaman	(E3)	9	3.0
Thuy Thu	Seaman	Seaman Apprentice	(E2)	182	60.9
Binh Si Quan Dich	Seaman Recruit	Seaman Recruit	(E1)	19	6.4
		Total		299	100.0

Table 3.17. Republic of Vietnam Marine Corps Ranks

Vietnamese Rank	Translation	USMC Equivalent		No.	%
Thuong Si Nhat	Senior NCO 1st Class	Sergeant Major	(E9)	1	0.3
Thuong Si	Senior NCO	First Sergeant	(E8)	4	1.3
Trung Si Nhat	Intermediate NCO 1st Class	Gunnery Sergeant	(E7)	8	2.7
Trung Si	Intermediate NCO	Staff Sergeant	(E6)	22	7.3
Ha Si Nhat	Junior NCO 1st Class	Sergeant	(E5)	4	1.3
Ha Si	Junior NCO	Corporal	(E4)	23	7.6
Binh Nhat	Private 1st Class	Lance Corporal	(E3)	23	7.6
Binh Nhi	Private	Private 1st Class	(E2)	216	71.9
Binh Nhi Quan Dich	Recruit	Private	(E1)	-	-
		Total		301	100.0

Table 3.18. Republic of Vietnam Air Force Ranks

Vietnamese Rank	Translation	USAF Equivalent		No.	%
Officers:					
Dai Uy	Senior grade Junior Officer	Captain		-	-
Trung Uy	Intermediate grade Junior Officer	1st Lieutenant		1	0.3
Thieu Uy	Junior grade Junior Officer	2nd Lieutenant		3	1.0
Chuan Uy	Student Officer	Cadet		2	0.7
Sinh Vien Si Quan	Student Officer Candidate	Officer Candidate		-	-
Enlisted Men:					
Thuong Si Nhat	Senior NCO 1st Class	Chief Master Sgt	(E9)	2	0.7
Thuong Si	Senior NCO	Senior Master Sgt	(E8)	10	3.3
Trung Si Nhat	Intermediate NCO 1st Class	Master Sergeant	(E7)	23	7.6
Trung Si	Intermediate NCO	Technical Sergeant	(E6)	45	14.8
Ha Si Nhat	Junior NCO 1st Class	Staff Sergeant	(E5)	87	28.6
Ha Si	Junior NCO	Airman 1st Class	(E4)	14	4.6
Binh Nhat	Private 1st Class	Airman 2nd Class	(E3)	12	3.9
Binh Nhi	Private	Airman 3rd Class	(E2)	105	34.5
Binh Nhi Quan Dich	Recruit	Airman	(E1)	-	-
		Total		304	100.0

(7) Length of Military Service

The length of military service among Vietnamese personnel measured during the anthropometric survey ranged from a few months for young recruits to as much as 32 years in the case of one Army sergeant. The distribution of length of service is given in Table 3.19 and is summarized in Table 3.20. In the total series, 20 percent had been in service from one to eleven months while 18 percent had been in service from twelve to 23 months. Thus, 38 percent of the total series had less than two years of military service and 62 percent had between two and 19 years of service. There were three men in the series who had records of over 20 years of military service.

Table 3.19. Length of Military Service

Duration	Army	Navy	Marine Corps	Air Force	Total Series
1-2 months	96	2	-	-	98
3-5 months	128	2	3	25	158
6-8 months	52	12	21	20	105
9-11 months	20	20	9	18	67
12-14 months	30	23	35	5	93
15-17 months	10	40	71	4	125
18-20 months	24	30	27	14	95
21-23 months	8	18	37	7	70
2 years	103	33	11	6	153
3 years	134	18	18	12	182
4 years	18	3	1	7	29
5 years	62	12	6	10	90
6 years	62	7	2	4	75
7 years	30	17	11	44	102
8 years	59	10	4	6	79
9 years	146	23	10	73	252
10 years	53	18	10	33	114
11 years	37	7	5	6	55
12 years	76	3	6	7	92
13 years	18	-	2	3	23
14 years	21	-	2	-	23
15 years	20	-	4	-	24
16 years	5	-	1	-	6
17 years	6	1	3	-	10
18 years	4	-	-	-	4
19 years	1	-	1	-	2
23 years	1	-	-	-	1
24 years	-	-	1	-	1
32 years	1	-	-	-	1
Total	1225	299	301	304	2129

Table 3.20. Summary of Length of Service

Duration	Army		Navy		Marine Corps		Air Force		Total Series	
	No.	%	No.	%	No.	%	No.	%	No.	%
1-11 months	296	24.2	36	12.0	33	11.0	63	20.7	428	20.1
12-23 months	72	5.9	111	37.1	170	56.5	30	9.9	383	18.0
2-9 years	614	50.1	123	41.2	63	20.9	162	53.3	962	45.2
10-19 years	241	19.7	29	9.7	34	11.3	49	16.1	353	16.6
20-32 years	2	0.1	-	-	1	0.3	-	-	3	0.1
Total	1225	100.0	299	100.0	301	100.0	304	100.0	2129	100.0

4. RESULTS OF THE SURVEY

a. Description of Measurements

For ready reference by users of this report, brief descriptions of the 51 measurements taken during the survey in Vietnam are given below. The measurements are listed in the order of presentation of the data, rather than the order in which they were taken on the men. Sketches illustrating the measurements may be found facing the tables of percentile values in Section 4,b. (Figures 2 to 5).

DESCRIPTION OF MEASUREMENTS

Subject Standing Erect (Figure 2):

1. Stature: Measured as distance from floor to top of head (vertex).

2. Shoulder Height: Measured as distance from floor to outer point of right shoulder (acromiale).

3. Waist Height: Measured as distance from floor to top of right hip bone (superior margin of ilium).

4. Crotch Height: Measured as distance from floor to crotch.

5. Kneecap Height: Measured as distance from floor to top of right kneecap (superior margin of patella).

6. Hip Breadth, Standing: Measured as maximum breadth across the hips.

Subject Sitting Erect on Table or Bench (Figure 3):

7. Sitting Height: Measured as distance from table surface to top of head (vertex).

8. Eye Height, Sitting: Measured as distance from table surface to level of inner corner of right eye (right inner canthus).

9. Shoulder Height, Sitting: Measured as distance from table surface to outer point of right shoulder (acromiale).

10. Shoulder-Elbow Length: With right arm held to form a right angle at elbow, measured as distance from outer point of shoulder (acromiale) to elbow (olecranon process).

11. Forearm-Hand Length: With right arm held to form a right angle at elbow and with hand extended, measured as distance from elbow (olecranon process) to tip of middle finger (dactylion).

12. Buttock-Knee Length: With legs bent to form right angle at knee, measured as distance from rearmost projection of buttock to front of right kneecap.

13. Buttock-Popliteal Length: With legs bent to form right angle at knee, measured as distance from rearmost projection of buttock to back of right knee (medial head of gastrocnemius).

14. Knee Height, Sitting: With legs bent to form right angle at knee, measured as distance from surface of footrest to top of right knee.

15. Popliteal Height: With legs bent to form right angle at knee, measured as distance from surface of footrest to underside of right knee (tendon of biceps femoris).

16. Shoulder Breadth: Measured as maximum breadth across the shoulders, including upper arm muscles (between outermost projections of deltoids).

17. Hip Breadth, Sitting: Measured as maximum breadth across hips.

18. Arm reach Upward: With right arm and hand extended vertically above shoulder, measured as distance from table surface to tip of middle finger (dactylion).

19. Arm Reach Forward: With right arm and hand extended horizontally in front of subject, measured as distance from back of shoulder (greatest bulge of trapezius) to tip of middle finger (dactylion).

Body Circumferences (Figure 4,A):

20. Neck Circumference: Measured as maximum circumference of neck, with tape passing just below Adam's apple (thyroid cartilage).

21. Shoulder Circumference: Measured as maximum circumference of shoulder, with tape passing over bulge of both upper arm (deltoid) muscles.

22. Chest Circumference: Measured as average circumference of chest during normal breathing, with tape at level of nipples.

23. Waist Circumference: Measured as circumference at level of umbilicus, with abdomen relaxed.

24. Hip Circumference: Measured as maximum circumference of hips at level of greatest buttock protrusion.

25. Upper Arm Circumference: Measured as circumference of right upper arm at level of biceps muscle (relaxed), midway between shoulder and elbow.

26. Wrist Circumference: Measured as minimum circumference of right wrist above protrusion of wrist bone (proximal to styloid processes).

27. Crotch Thigh Circumference: Measured as circumference of the right upper thigh, with tape passing just below crease of buttock (gluteal furrow).

28. Lower Thigh Circumference: Measured as circumference of right lower thigh, with tape passing just above kneecap.

29. Calf Circumference: Measured as maximum circumference of right calf.

30. Ankle Circumference: Measured as minimum circumference of right ankle, with tape passing just above projections of ankle bones (malleoli).

Body Surface Measurements (Figure 4, B,C,D):

31. Back Waist Length: Measured as distance along surface of back from base of neck (cervicale) to level of waist (level of iliac crests).

32. Interscye Breadth: Measured as distance along surface of back between armpit creases.

33. Sleeve Inseam: With right arm extended and held away from side of body, measured as distance from front edge of right armpit (anterior margin of pectoralis major) to wrist (navicular).

34. Sleeve Length: With arms held horizontally, elbows bent and knuckles of fists pressed together, measured as distance along body surface from middle of back (spinal crease) over right elbow to wrist (middle of styloid process).

Head Measurements (Figure 5, A,B):

35. Head Length: Measured as maximum length of head from middle of forehead just above eyes (glabella) to back of head (posterior pole of occiput).

36. Head Height: Measured as distance from notch at front of right ear (tragion) to top of head (vertex).

37. Face Length: Measured as distance from depression of nose between eyes (nasion) to tip of chin (menton).

38. Head Breadth: Measured as maximum breadth of head, above and behind ears.

39. Head Circumference: Measured as maximum circumference of head with tape passing over forehead above eyebrow ridges and just above both ears.

40. Interpupillary Distance: Measured as distance between centers of pupils of eyes.

41. Face Breadth: Measured as maximum breadth of face between outermost bulges of cheek bones (zygomatic arches).

Hand Measurements (Figure 5,C):

42. Hand Length: With right hand extended, palm up and fingers straight, measured as distance from wrist (navicular) to tip of middle finger (dactylion).

43. Palm Length: With right hand extended, palm up, measured as distance from wrist (navicular) to base of middle finger.

44. Hand Breadth: With right hand extended, palm up, measured as maximum breadth across base of fingers (metacarpal-phalangeal joints).

Foot Measurements, Weight Equally Distributed on Both Feet (Figure 5, D,E):

45. Foot Length: Measured as distance from back of right heel to tip of longest toe.

46. Instep Length: Measured as distance from back of right heel to inner ball of foot (first metatarsal-phalangeal joint).

47. Foot Breadth: Measured as maximum breadth of right foot.

48. Ball Foot Circumference: Measured as maximum circumference of foot at widest point (distal ends of metatarsals).

49. Heel Breadth: Measured as maximum breadth of right heel behind and below projections of ankle bones (malleoli).

50. Heel-Ankle Circumference: Measured as diagonal circumference around right ankle, with tape passing under tip of heel and over instep at junction of foot and leg.

51. Weight: With subject dressed in undershorts, measured to nearest kilogram on spring platform scale.

b. Percentile Values

Presentation of anthropometric data in the form of percentile values is one of the most practical and useful methods for purposes of clothing and equipment sizing, design guidance, and other human engineering applications. The data from the anthropometric survey of Vietnam are given in four tables (Tables 4.1 - 4.4) which show nine percentile values for each measurement. These data are based upon the total series of 2,129 men. The values are given in centimeters, with the exception of weight which is shown in kilograms. Facing each of the tables are sketches which indicate the location of each body measurement (Figures 2 to 5).

In using the percentile values, it may be pointed out that for a particular dimension, the measurement on 95 percent of the men in the series will be equal to, or less than, the value shown for the 95th percentile, while on the remaining five percent the measurement will be greater than the 95th percentile value. In the case of stature, for example (Table 4.1) 95 percent of Vietnamese military personnel will be 169.6 centimeters or less in height, while only five percent will be taller than 169.6 centimeters. Similarly, the measurement on five percent of the men in the series will be equal to or less than the value shown for the 5th percentile, while on the remaining 95 percent, the measurement will be greater than the 5th percentile value. Again in the case of stature, five percent of Vietnamese military personnel will be 151.6 centimeters or less in height while 95 percent will be taller than 151.6 centimeters. In effect, then, the 1st and 99th percentile values of a measurement indicate the range of that measurement for the middle 98 percent of population, while the 5th and 95th percentile values of a measurement define the range for the middle 90 percent of the population.

For ready reference by those not accustomed to the metric system, percentile values for all of the body measurements are given in inches in Tables 4.5, 4.6, and 4.7. Weight (51 in Table 4.7) is shown in pounds.

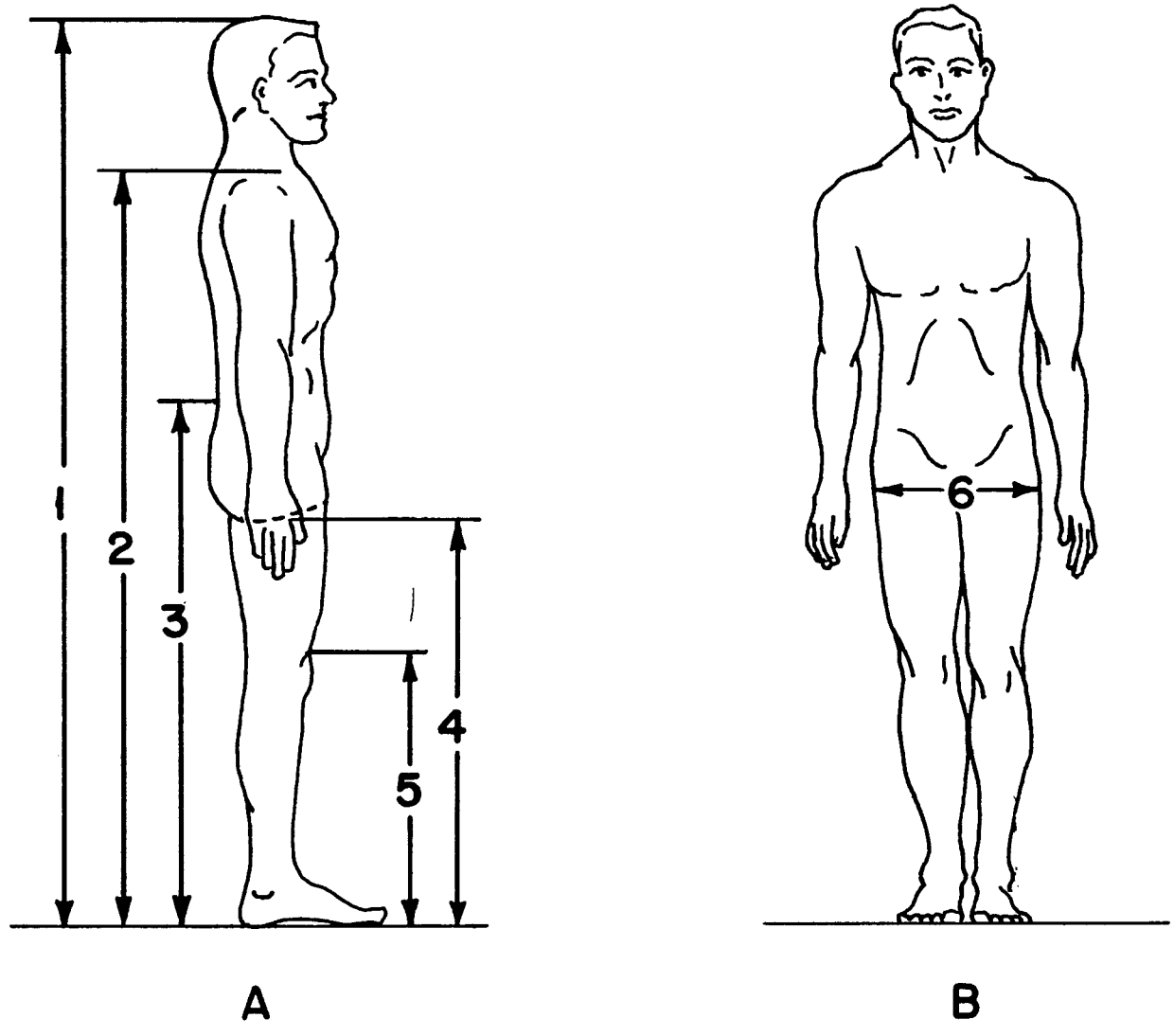


Figure 2. Standing measurements

Table 4.1. Percentiles of Standing Measurements
(values in centimeters)

		PERCENTILES								
	STANDING MEASUREMENTS	1st	5th	10th	25th	50th	75th	90th	95th	99th
1	Stature	148.1	151.6	153.4	156.8	160.4	164.3	167.7	169.6	173.0
2	Shoulder Height	120.4	123.1	125.0	127.9	131.2	134.8	137.8	140.0	143.5
3	Waist Height	83.3	85.7	87.4	89.9	92.7	95.7	98.5	100.3	103.1
4	Crotch Height	65.0	67.1	68.7	71.2	73.8	76.6	79.0	80.6	83.8
5	Kneecap Height	40.8	42.4	43.3	44.7	46.3	48.0	49.7	50.7	52.4
6	Hip Breadth, Standing	26.0	26.8	27.3	28.1	29.0	29.9	30.8	31.5	32.7

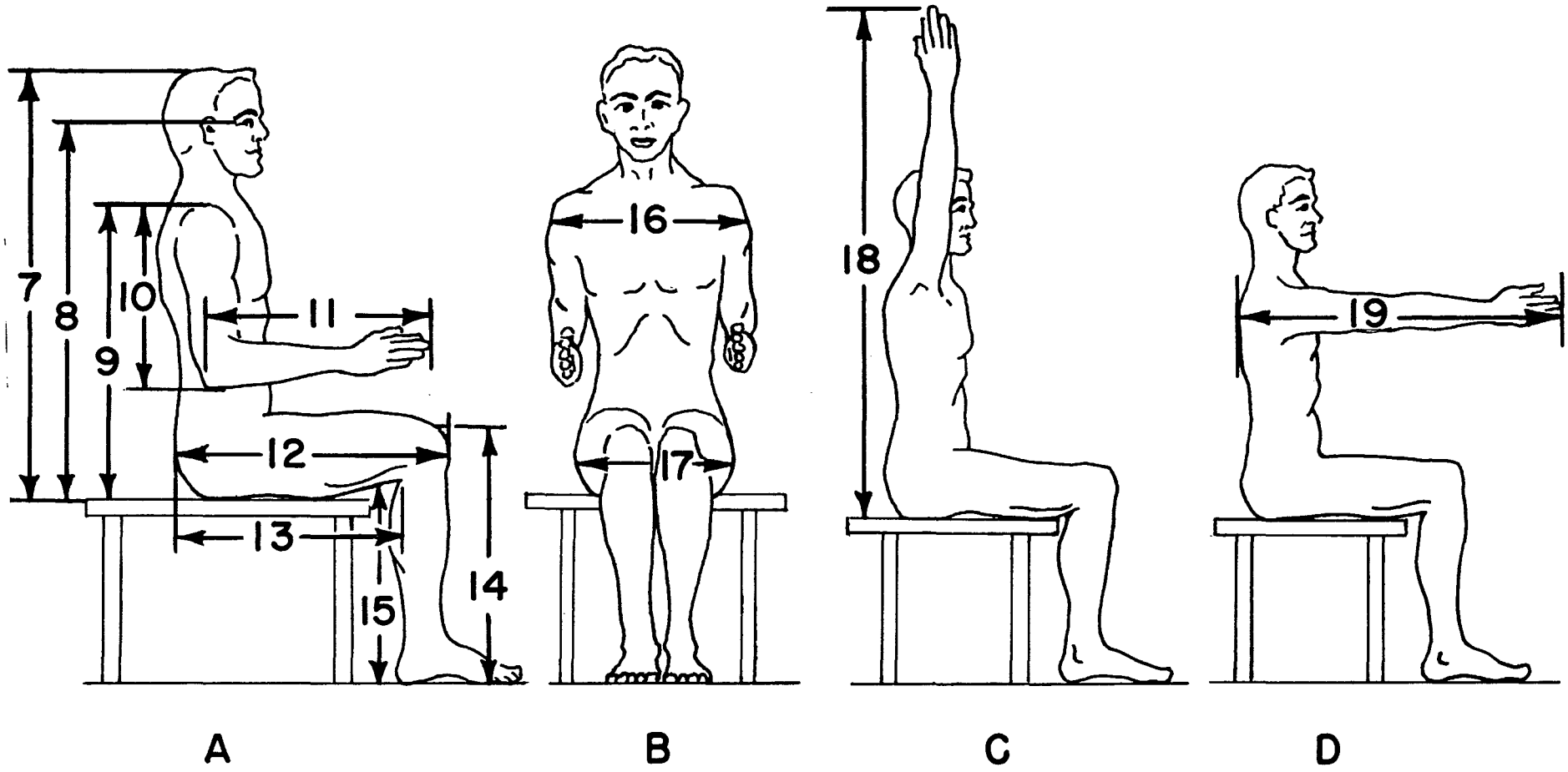


Figure 3. Sitting measurements

Table 4.2. Percentiles of Sitting Measurements
(values in centimeters)

		PERCENTILES								
	SITTING MEASUREMENTS	1st	5th	10th	25th	50th	75th	90th	95th	99th
7	Sitting Height	77.5	79.6	80.9	82.8	85.0	87.3	89.3	90.5	92.5
8	Eye Height, Sitting	65.7	67.8	69.0	71.0	73.1	75.4	77.3	78.5	80.9
9	Shoulder Height, Sitting	49.7	51.5	52.5	54.3	56.2	58.2	60.1	61.0	63.1
10	Shoulder-Elbow Length	30.2	31.3	31.9	32.7	33.8	35.0	36.0	36.6	37.7
11	Forearm-Hand Length	40.2	41.3	42.0	43.2	44.5	45.9	47.2	47.9	49.4
12	Buttock-Knee Length	46.3	48.4	49.4	51.0	52.7	54.4	56.2	57.4	59.4
13	Buttock-Popliteal Length	38.7	40.3	41.1	42.5	44.2	46.0	47.8	48.9	50.8
14	Knee Height, Sitting	43.0	44.4	45.2	46.4	47.9	49.4	50.8	51.9	53.5
15	Popliteal Height	36.8	38.2	38.9	40.0	41.3	42.7	43.9	44.8	46.5
16	Shoulder Breadth	36.4	37.6	38.3	39.5	40.8	42.2	43.4	44.3	46.6
17	Hip Breadth, Sitting	26.2	27.2	27.9	29.0	30.1	31.5	32.8	33.7	35.7
18	Arm Reach, Upward	119.3	122.1	123.6	126.5	129.8	133.2	135.8	137.6	141.2
19	Arm Reach, Forward	73.5	75.8	76.9	78.8	81.2	83.6	85.8	87.1	89.6

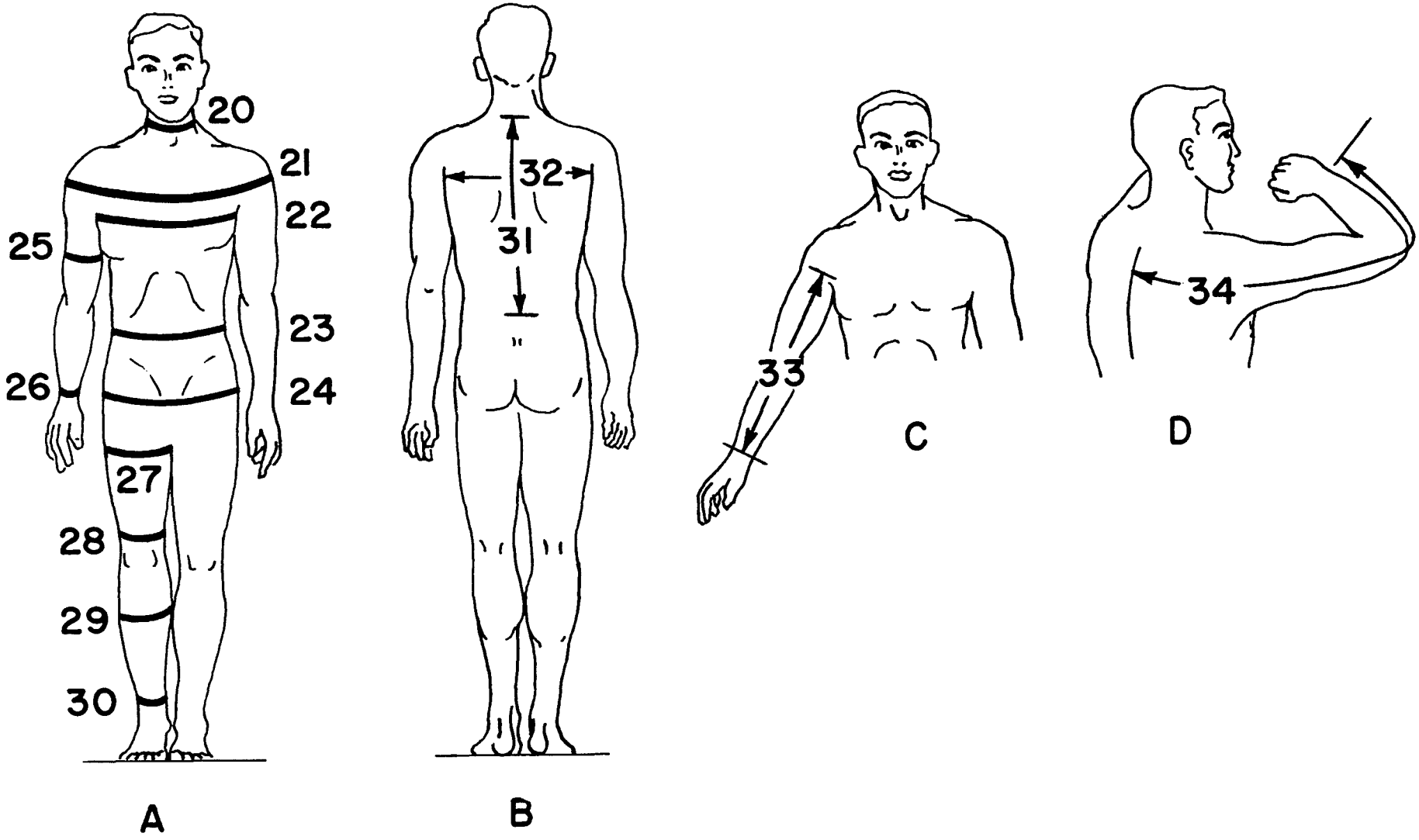
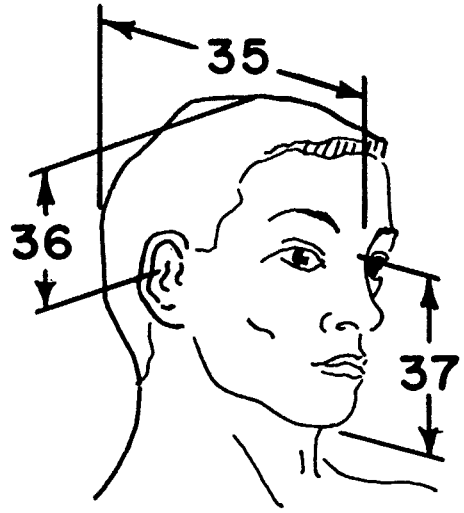


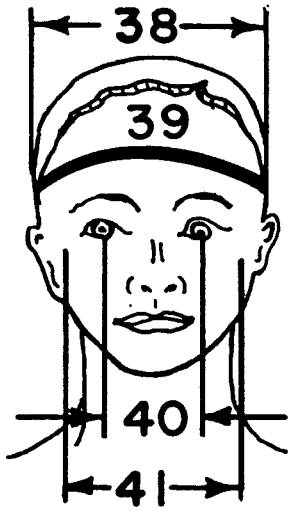
Figure 4. Body circumferences and surface measurements

Table 4.3. Percentiles of Circumferences and Surface Measurements
(values in centimeters)

		PERCENTILES								
	BODY CIRCUMFERENCES	1st	5th	10th	25th	50th	75th	90th	95th	99th
20	Neck Circumference	30.2	31.2	31.8	32.6	33.7	34.8	35.9	36.7	37.9
21	Shoulder Circumference	91.1	93.6	95.1	97.7	100.6	103.6	106.5	108.3	113.1
22	Chest Circumference	72.2	74.5	75.9	78.2	80.8	83.7	86.7	88.5	93.2
23	Waist Circumference	58.1	60.7	62.2	64.5	67.1	70.1	73.9	76.8	84.1
24	Hip Circumference	74.5	76.7	78.1	80.2	82.6	85.2	87.9	89.9	95.2
25	Upper Arm Circumference	20.3	21.3	21.9	22.9	23.9	25.2	26.4	27.2	29.0
26	Wrist Circumference	12.9	13.5	13.8	14.2	14.9	15.4	16.0	16.4	17.0
27	Crotch Thigh Circum.	40.5	42.3	43.4	45.3	47.5	50.0	52.1	53.8	57.4
28	Lower Thigh Circum.	29.2	30.9	31.6	33.1	35.0	37.1	39.3	40.6	44.0
29	Calf Circumference	27.8	29.2	29.9	31.1	32.4	33.9	35.2	36.1	37.9
30	Ankle Circumference	17.7	18.3	18.8	19.4	20.0	20.9	21.4	21.9	22.5
	SURFACE MEASUREMENTS									
31	Back Waist Length	40.6	42.1	43.0	44.6	46.3	48.1	49.7	50.7	52.7
32	Interscye	30.5	32.2	33.0	34.4	36.0	37.6	39.0	40.1	42.3
33	Sleeve Inseam	39.6	40.9	41.6	42.8	44.4	46.0	47.5	48.4	50.3
34	Sleeve Length	69.6	71.9	73.2	75.3	77.7	80.0	82.1	83.4	85.8



A



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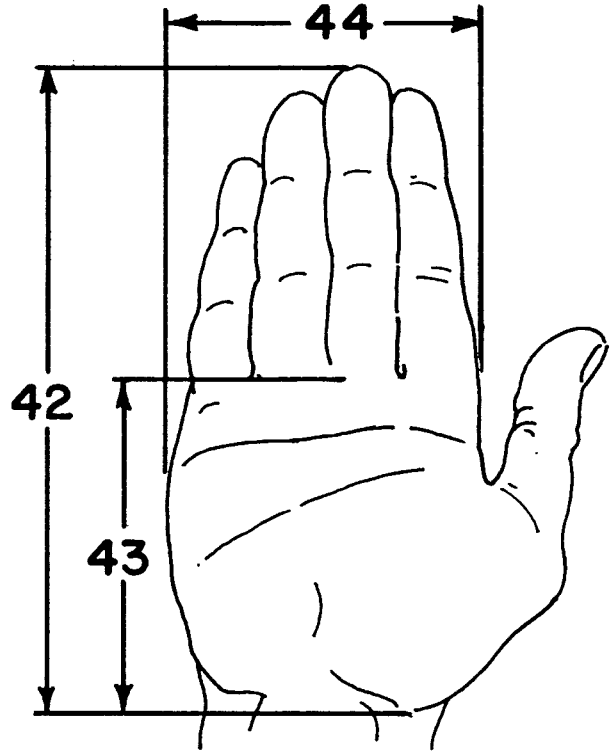

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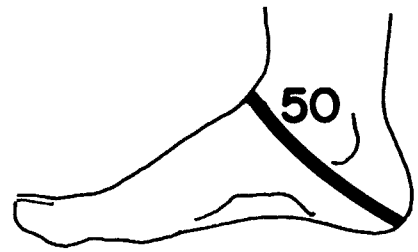

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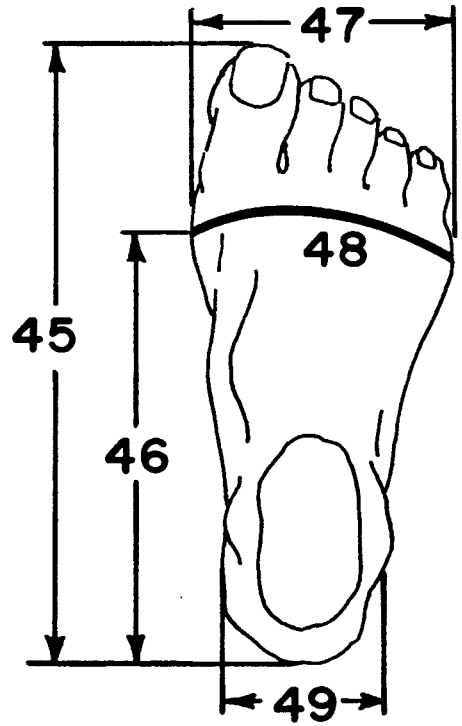

D

Figure 5. Head, hand and foot measurements

Table 4.4. Percentiles of Head, Hand and Foot Measurements
(values in centimeters)

		PERCENTILES								
	HEAD MEASUREMENTS	1st	5th	10th	25th	50th	75th	90th	95th	99th
35	Head Length	16.5	17.0	17.2	17.7	18.1	18.6	19.0	19.2	19.7
36	Head Height	10.4	11.0	11.2	11.7	12.3	12.8	13.3	13.5	13.9
37	Face Length	9.9	10.3	10.5	10.9	11.2	11.7	12.0	12.3	12.8
38	Head Breadth	13.3	13.9	14.1	14.5	14.9	15.2	15.6	15.8	16.3
39	Head Circumference	51.0	52.0	52.4	53.3	54.2	55.2	56.1	56.7	57.8
40	Interpupillary Distance	5.4	5.7	5.8	6.0	6.2	6.3	6.5	6.7	7.0
41	Face Breadth	11.2	11.8	12.0	12.4	12.7	13.1	13.5	13.6	14.0
	HAND MEASUREMENTS									
42	Hand Length	15.6	16.2	16.5	17.0	17.5	18.1	18.6	18.9	19.5
43	Palm Length	8.9	9.2	9.4	9.7	10.1	10.5	10.8	11.0	11.4
44	Hand Breadth	7.0	7.3	7.4	7.7	8.0	8.3	8.5	8.7	9.0
	FOOT MEASUREMENTS									
45	Foot Length	21.3	21.9	22.3	22.9	23.6	24.4	25.0	25.4	26.0
46	Instep Length	15.0	15.5	15.9	16.4	17.0	17.5	18.0	18.5	19.0
47	Foot Breadth	8.0	8.4	8.5	8.9	9.3	9.7	10.0	10.4	10.9
48	Ball Foot Circumference	20.9	21.9	22.1	23.0	24.0	25.0	26.2	27.0	28.7
49	Heel Breadth	5.2	5.5	5.7	5.9	6.1	6.4	6.6	6.8	7.1
50	Heel-Ankle Circumference	27.9	28.5	29.0	29.9	30.9	31.8	32.6	33.0	34.0
51	Weight (kilograms)	39.8	42.4	44.2	46.7	50.5	54.7	58.5	61.5	70.0

Table 4.5. Percentiles of Standing and Sitting Measurements

(values in inches)

		PERCENTILES								
	STANDING MEASUREMENTS	1st	5th	10th	25th	50th	75th	90th	95th	99th
1	Stature	58.3	59.7	60.4	61.7	63.2	64.7	66.0	66.8	68.1
2	Shoulder Height	47.4	48.5	49.2	50.4	51.6	53.1	54.2	55.1	56.5
3	Waist Height	32.8	33.7	34.4	35.0	36.5	37.7	38.8	39.5	40.6
4	Crotch Height	25.6	26.4	27.0	28.0	29.0	30.2	31.1	31.7	33.0
5	Kneecap Height	16.1	16.7	17.0	17.6	18.2	18.9	19.6	20.0	20.6
6	Hip Breadth, Standing	10.2	10.6	10.7	11.1	11.4	11.8	12.1	12.4	12.9
	SITTING MEASUREMENTS									
7	Sitting Height	30.5	31.3	31.8	32.6	33.5	34.4	35.2	35.6	36.4
8	Eye Height, Sitting	25.9	26.7	27.2	28.0	28.8	29.7	30.4	30.9	31.8
9	Shoulder Height, Sitting	19.6	20.3	20.7	21.4	22.1	22.9	23.7	24.0	24.8
10	Shoulder-Elbow Length	11.9	12.3	12.6	12.9	13.3	13.8	14.2	14.4	14.8
11	Forearm-Hand Length	15.8	16.3	16.6	17.0	17.5	18.1	18.6	18.8	19.4
12	Buttock-Knee Length	18.2	19.0	19.4	20.1	20.7	21.4	22.1	22.6	23.4
13	Buttock-Popliteal Length	15.2	15.9	16.2	16.7	17.4	18.1	18.8	19.2	20.0
14	Knee Height, Sitting	16.9	17.5	17.8	18.3	18.8	19.4	20.0	20.4	21.1
15	Popliteal Height	14.5	15.0	15.3	15.7	16.3	16.8	17.3	17.6	18.3
16	Shoulder Breadth	14.3	14.8	15.1	15.6	16.1	16.6	17.0	17.4	18.3
17	Hip Breadth, Sitting	10.3	10.7	11.0	11.4	11.8	12.4	12.9	13.3	14.0
18	Arm Reach, Upward	47.0	48.1	48.7	49.8	51.1	52.4	53.5	54.2	55.6
19	Arm Reach, Forward	28.9	29.8	30.3	31.0	32.0	32.9	33.8	34.3	35.3

Table 4.6. Percentiles of Circumferences and Surface Measurements

(values in inches)

		PERCENTILES								
	BODY CIRCUMFERENCES	1st	5th	10th	25th	50th	75th	90th	95th	99th
20	Neck Circumference	11.9	12.3	12.5	12.8	13.3	13.7	14.1	14.4	14.9
21	Shoulder Circumference	35.9	36.8	37.4	38.5	39.6	40.8	41.9	42.6	44.5
22	Chest Circumference	28.4	29.3	29.9	30.8	31.8	33.0	34.1	34.8	36.7
23	Waist Circumference	22.9	23.9	24.5	25.4	26.4	27.6	29.1	30.2	33.1
24	Hip Circumference	29.3	30.2	30.7	31.6	32.5	33.5	34.6	35.4	37.5
25	Upper Arm Circumference	8.0	8.4	8.6	9.0	9.4	9.9	10.4	10.7	11.4
26	Wrist Circumference	5.1	5.3	5.4	5.6	5.9	6.1	6.3	6.5	6.7
27	Crotch Thigh Circum.	15.9	16.6	17.1	17.8	18.6	19.7	20.5	21.2	22.6
28	Lower Thigh Circum.	11.5	12.2	12.4	13.0	13.8	14.6	15.5	16.0	17.3
29	Calf Circumference	10.9	11.5	11.8	12.2	12.8	13.3	13.8	14.2	14.9
30	Ankle Circumference	7.0	7.2	7.4	7.6	7.9	8.2	8.4	8.6	8.8
	SURFACE MEASUREMENTS									
31	Back Waist Length	16.0	16.6	16.9	17.6	18.2	18.9	19.6	20.0	20.7
32	Interscye	12.0	12.7	13.0	13.5	14.2	14.8	15.4	15.8	16.6
33	Sleeve Inseam	15.6	16.1	16.4	16.8	17.5	18.1	18.7	19.0	19.8
34	Sleeve Length	27.4	28.3	28.8	29.6	30.6	31.5	32.3	32.8	33.8

Table 4.7. Percentiles of Head, Hand and Foot Measurements

(values in inches)

		PERCENTILES								
	HEAD MEASUREMENTS	1st	5th	10th	25th	50th	75th	90th	95th	99th
35	Head Length	6.5	6.7	6.8	7.0	7.1	7.3	7.5	7.6	7.8
36	Head Height	4.1	4.3	4.4	4.6	4.8	5.0	5.2	5.3	5.5
37	Face Length	3.9	4.1	4.1	4.3	4.4	4.6	4.7	4.8	5.0
38	Head Breadth	5.2	5.5	5.6	5.7	5.9	6.0	6.1	6.2	6.4
39	Head Circumference	20.1	20.5	20.6	21.0	21.3	21.7	22.1	22.3	22.8
40	Interpupillary Distance	2.1	2.2	2.3	2.4	2.4	2.5	2.6	2.6	2.7
41	Face Breadth	4.4	4.6	4.7	4.9	5.0	5.2	5.3	5.4	5.5
	HAND MEASUREMENTS									
42	Hand Length	6.2	6.4	6.5	6.7	6.9	7.1	7.3	7.4	7.7
43	Palm Length	3.5	3.6	3.7	3.8	4.0	4.1	4.2	4.3	4.5
44	Hand Breadth	2.7	2.9	2.9	3.0	3.1	3.2	3.3	3.4	3.5
	FOOT MEASUREMENTS									
45	Foot Length	8.4	8.6	8.8	9.0	9.3	9.6	9.8	10.0	10.2
46	Instep Length	5.9	6.1	6.3	6.5	6.7	6.9	7.1	7.3	7.5
47	Foot Breadth	3.1	3.3	3.4	3.5	3.7	3.8	3.9	4.1	4.3
48	Ball Foot Circumference	8.2	8.6	8.7	9.0	9.4	9.8	10.3	10.6	11.3
49	Heel Breadth	2.1	2.2	2.2	2.3	2.4	2.5	2.6	2.7	2.8
50	Heel-Ankle Circumference	11.0	11.2	11.4	11.8	12.2	12.5	12.8	13.0	13.4
51	Weight (pounds)	87.6	93.3	97.2	102.7	111.1	120.3	128.7	135.3	154.0

c. Means and Standard Deviations

While the anthropometric data for a population are useful in the form of percentiles, other statistical values also are of interest. There are two kinds of averages frequently employed for anthropometric data. These are the arithmetic mean and the median. The mean of a measurement is the average value of that measurement obtained by dividing the sum of the values by the number of values. The median may be defined as the middle value in a series of data. Since the median corresponds to the 50th percentile value, medians are not shown separately but they may be found in the tables of percentiles.

The standard deviation (S.D.) is an indication of the variability of a measurement within the population. If most of the values for a measurement are close to the mean value, the standard deviation will be small, but if many of the values are much lower or higher than the mean, the standard deviation will be large. As a general estimate, the mean minus one standard deviation and plus one standard deviation will give a range which covers approximately the middle two-thirds of the values for any given measurement. Similarly, a range determined by subtracting and adding two standard deviations from and to the mean will include approximately 95 percent of the values for a given measurement. Practically all of the values of a measurement will fall within a range determined by subtracting and adding three standard deviations from and to the mean value of that measurement.

Finally, the coefficient of variation (V) is a statistical value which expresses the standard deviation as a percentage of the mean.

While the anthropometric survey of Vietnam included samples of men drawn from the Army, Navy, Marine Corps and Air Force, the percentile values for the body measurements discussed previously are based upon the total series of 2,129 Vietnamese military personnel. However, additional statistical values have been computed for the total series, and for the Army, Navy, Marine Corps and Air Force samples separately. These statistical values, consisting of the number of men (N), the mean, the standard deviation (S.D.) and the coefficient of variation (V) for each body measurement are presented in Tables 4.8 and 4.9. The means and standard deviations are given in centimeters (with weight in kilograms), while the coefficients of variation are expressed as percentages.

Table 4.8. Statistical Values of Standing, Sitting and Circumference Measurements

(values in centimeters)

		ARMY				NAVY			
	STANDING MEASUREMENTS	N	Mean	S.D.	V(%)	N	Mean	S.D.	V(%)
1	Stature	1225	159.9	5.4	3.4	299	160.9	4.9	3.0
2	Shoulder Height	1223	131.0	5.1	3.9	299	131.4	4.5	3.4
3	Waist Height	1225	92.4	4.3	4.6	299	92.9	3.9	4.2
4	Crotch Height	1224	73.5	3.9	5.3	299	74.3	3.8	5.1
5	Kneecap Height	1224	46.1	2.4	5.2	299	46.6	2.4	5.2
6	Hip Breadth, Standing	1224	29.0	1.4	4.8	299	29.0	1.3	4.5
	SITTING MEASUREMENTS								
7	Sitting Height	1222	84.5	3.2	3.9	298	85.6	3.1	3.6
8	Eye Height, Sitting	1225	72.6	3.2	4.4	298	73.7	3.2	4.3
9	Shoulder Ht., Sitting	1225	56.2	2.9	5.2	296	56.0	2.8	5.0
10	Shoulder-Elbow Length	1224	33.8	1.6	4.7	299	33.8	1.5	4.4
11	Forearm-Hand Length	1225	44.5	1.9	4.3	299	44.5	1.8	4.0
12	Buttock-Knee Length	1221	52.5	2.8	5.3	299	52.8	2.3	4.4
13	Buttock-Popliteal Lgth	1221	44.1	2.6	5.9	299	43.9	2.3	5.2
14	Knee Height, Sitting	1224	47.6	2.2	4.6	299	48.2	2.2	4.6
15	Popliteal Height	1224	41.5	2.0	4.8	299	40.9	2.1	5.1
16	Shoulder Breadth	1222	40.6	2.0	4.9	299	41.3	2.0	4.8
17	Hip Breadth, Sitting	1224	30.2	1.8	6.0	299	30.0	2.0	6.7
18	Arm Reach Upward	1225	129.4	4.7	3.6	299	129.8	4.4	3.4
19	Arm Reach Forward	1223	81.4	3.3	4.0	299	80.8	3.2	4.0
	BODY CIRCUMFERENCES								
20	Neck Circumference	1225	33.8	1.6	4.7	299	33.5	1.6	4.8
21	Shoulder Circumference	1225	100.7	4.5	4.5	299	100.5	4.5	4.5
22	Chest Circumference	1225	81.1	4.2	5.2	299	80.6	4.2	5.2
23	Waist Circumference	1223	67.7	4.7	6.9	299	66.9	4.4	6.6
24	Hip Circumference	1213	83.0	4.0	4.8	299	81.8	3.8	4.6
25	Upper Arm Circum.	1225	24.0	1.7	7.1	299	24.0	1.7	7.1
26	Wrist Circumference	1225	14.9	0.9	6.0	299	14.8	0.8	5.4
27	Crotch Thigh Circum.	1223	47.7	3.5	7.3	299	48.3	3.5	7.2
28	Lower Thigh Circum.	1225	35.2	3.1	8.8	299	35.2	2.7	7.7
29	Calf Circumference	1219	32.6	2.1	6.4	299	32.5	2.0	6.2
30	Ankle Circumference	1219	20.1	1.0	5.0	299	20.2	1.1	5.4

Table 4.8. Continued

	MARINE CORPS				AIR FORCE				TOTAL SERIES			
	N	Mean	S.D.	V(%)	N	Mean	S.D.	V(%)	N	Mean	S.D.	V(%)
1	301	161.8	5.8	3.6	304	161.5	5.3	3.3	2129	160.5	5.5	3.4
2	301	132.3	5.4	4.1	304	132.1	4.8	3.6	2127	131.4	5.0	3.8
3	301	94.1	4.5	4.8	303	93.4	4.3	4.6	2128	92.8	4.3	4.6
4	301	74.9	4.2	5.6	304	74.2	4.0	5.4	2128	73.9	4.0	5.4
5	301	47.3	2.5	5.3	303	46.7	2.4	5.1	2127	46.4	2.4	5.2
6	301	29.3	1.3	4.4	304	29.3	1.5	5.1	2128	29.1	1.4	4.8
7	300	86.0	3.3	3.8	304	85.8	3.1	3.6	2124	85.0	3.3	3.9
8	301	73.6	3.2	4.3	304	74.0	3.1	4.2	2128	73.1	3.2	4.4
9	301	56.6	2.9	5.1	304	56.6	2.9	5.1	2126	56.3	2.9	5.2
10	301	34.3	1.7	5.0	304	33.7	1.6	4.7	2128	33.9	1.6	4.7
11	301	45.0	2.1	4.7	304	44.5	2.0	4.5	2129	44.6	2.0	4.5
12	300	53.4	2.7	5.0	304	52.9	2.6	4.9	2124	52.7	2.7	5.1
13	300	45.3	2.6	5.7	304	44.7	2.6	5.8	2124	44.4	2.6	5.8
14	301	48.9	2.3	4.7	303	48.0	2.0	4.2	2127	47.9	2.2	4.6
15	301	42.1	2.0	4.8	304	40.6	1.8	4.4	2128	41.4	2.0	4.8
16	300	41.5	2.1	5.1	301	41.3	2.1	5.1	2122	40.9	2.0	4.9
17	301	30.6	2.1	6.9	302	30.5	2.1	6.9	2126	30.3	2.0	6.6
18	301	131.0	5.1	3.9	304	130.3	4.9	3.8	2129	129.8	4.8	3.7
19	300	81.7	4.0	4.9	303	81.0	3.7	4.6	2125	81.3	3.4	4.2
20	301	33.9	1.6	4.7	304	33.8	1.6	4.7	2129	33.8	1.6	4.7
21	301	101.2	4.3	4.2	301	101.0	5.1	5.0	2126	100.8	4.6	4.6
22	301	81.6	4.2	5.1	302	81.0	4.7	5.8	2127	81.1	4.3	5.3
23	301	67.7	4.7	6.9	304	68.3	6.2	9.1	2127	67.7	5.0	7.4
24	299	83.1	4.0	4.8	303	83.0	4.5	5.4	2114	82.9	4.0	4.8
25	300	24.5	1.7	6.9	304	24.1	2.0	8.3	2128	24.1	1.8	7.5
26	300	15.0	0.8	5.3	304	14.7	0.9	6.1	2128	14.9	0.9	6.0
27	300	47.6	3.3	6.9	303	47.6	4.0	8.4	2125	47.7	3.6	7.5
28	301	35.4	2.9	8.2	304	35.5	3.3	9.3	2129	35.3	3.0	8.5
29	301	32.8	2.1	6.4	304	32.0	2.2	6.9	2123	32.5	2.1	6.5
30	301	20.2	1.0	5.0	303	19.9	1.1	5.5	2122	20.1	1.2	6.0

Table 4.9. Statistical Values of Surface, Head, Hand and Foot Measurements
(values in centimeters)

		ARMY				NAVY			
	SURFACE MEASUREMENTS	N	Mean	S.D.	V(%)	N	Mean	S.D.	V(%)
31	Back Waist Length	1221	45.9	2.5	5.4	299	47.1	2.4	5.1
32	Interscye Breadth	1224	36.1	2.3	6.4	299	35.8	2.5	7.0
33	Sleeve Inseam	1223	44.3	2.2	5.0	299	44.6	2.0	4.5
34	Sleeve Length	1221	77.4	3.4	4.4	299	77.3	3.4	4.4
	HEAD MEASUREMENTS								
35	Head Length	1223	18.2	0.7	3.8	299	18.0	0.8	4.4
36	Head Height	1222	12.3	0.8	6.5	299	12.2	0.7	5.7
37	Face Length	1225	11.3	0.6	5.3	298	11.3	0.6	5.3
38	Head Breadth	1224	14.9	0.6	4.0	299	14.8	0.7	4.7
39	Head Circumference	1225	54.2	1.4	2.6	299	54.2	1.4	2.6
40	Interpupillary Distance	1222	6.2	0.3	4.8	299	6.3	0.3	4.8
41	Face Breadth	1224	12.9	0.5	3.9	298	12.4	0.6	4.8
	HAND MEASUREMENTS								
42	Hand Length	1225	17.5	0.8	4.6	299	17.6	0.7	4.0
43	Palm Length	1223	10.2	0.5	4.9	299	10.1	0.5	5.0
44	Hand Breadth	1221	8.0	0.4	5.0	299	8.0	0.4	5.0
	FOOT MEASUREMENTS								
45	Foot Length	1225	23.6	1.0	4.2	299	23.7	1.0	4.2
46	Instep Length	1224	17.0	0.9	5.3	299	17.1	0.8	4.7
47	Foot Breadth	1221	9.4	0.6	6.4	299	9.1	0.6	6.6
48	Ball Foot Circumference	1211	24.3	1.7	7.0	299	23.7	1.3	5.5
49	Heel Breadth	1223	6.2	0.4	6.4	299	6.1	0.4	6.6
50	Heel-Ankle Circumference	1219	30.8	1.3	4.2	299	31.2	1.5	4.8
51	Weight (kilograms)	1225	51.1	5.9	11.5	299	50.1	5.4	10.8

Table 4.9. Continued

	MARINE CORPS				AIR FORCE				TOTAL SERIES			
	N	Mean	S.D.	V(%)	N	Mean	S.D.	V(%)	N	Mean	S.D.	V(%)
31	300	47.2	2.7	5.7	304	46.8	2.5	5.3	2124	46.4	2.6	5.6
32	301	36.0	2.4	6.7	304	36.1	2.6	7.2	2128	36.0	2.4	6.7
33	298	45.2	2.5	5.5	303	44.6	2.5	5.6	2123	44.5	2.3	5.2
34	299	78.5	3.8	4.8	303	78.2	3.5	4.5	2122	77.6	3.5	4.5
35	301	18.2	0.6	3.3	304	18.2	0.6	3.3	2127	18.2	0.7	3.8
36	300	12.4	0.7	5.6	304	12.4	0.8	6.4	2125	12.3	0.8	6.5
37	301	11.3	0.6	5.3	304	11.4	0.6	5.3	2128	11.3	0.6	5.3
38	301	14.9	0.5	3.4	304	15.1	0.6	4.0	2128	14.9	0.6	4.0
39	301	54.3	1.4	2.6	304	54.4	1.5	2.8	2129	54.2	1.4	2.6
40	301	6.2	0.3	4.8	304	6.2	0.3	4.8	2126	6.2	0.3	4.8
41	301	12.8	0.6	4.7	304	12.6	0.6	4.8	2127	12.8	0.6	4.7
42	299	17.8	0.9	5.0	304	17.6	0.8	4.5	2127	17.6	0.8	4.5
43	301	10.2	0.6	5.9	304	10.2	0.5	4.9	2127	10.2	0.5	4.9
44	301	8.1	0.4	4.9	304	7.9	0.4	5.1	2125	8.0	0.4	5.0
45	301	24.0	1.1	4.6	304	23.6	1.1	4.7	2129	23.7	1.0	4.2
46	301	17.3	0.8	4.6	304	17.2	0.9	5.2	2128	17.1	0.9	5.3
47	301	9.4	0.6	6.4	303	9.2	0.6	6.5	2124	9.3	0.6	6.4
48	301	24.2	1.5	6.2	303	23.8	1.6	6.7	2114	24.2	1.6	6.6
49	301	6.3	0.4	6.3	304	6.1	0.4	6.6	2127	6.2	0.4	6.4
50	301	31.2	1.4	4.5	304	30.6	1.3	4.2	2123	30.9	1.4	4.5
51	300	51.9	5.8	11.2	304	51.4	7.0	13.6	2128	51.1	6.0	11.7

5. DISCUSSION OF THE DATA

a. Republic of Vietnam Armed Forces

Since the survey included samples from the Army, Navy, Marine Corps and Air Force, data for these groups have been analyzed separately. A summary of the statistical values for the Vietnamese Armed Forces is given in Table 5.1.

The samples from the Armed Forces differ somewhat in mean age. The Navy sample had the lowest mean age (24.9 years), while Marine Corps personnel averaged one year older (25.9 years). The Army sample had an average age of 27.9 years, while the Air Force group had the highest mean age (28.1 years). The Navy sample had the lowest mean weight (50.1 kg.) and the Marines had the highest mean weight (51.9 kg.), while Army and Air Force personnel were intermediate in mean weight. With respect to stature, the Army series showed the lowest mean height and the Marine Corps had the tallest personnel, with the Navy and Air Force samples intermediate in stature. While minor differences in average body size do exist among the Armed Forces, these differences are not considered to be of practical significance.

Table 5.1. Statistical Values for Vietnamese Armed Forces

	Army		Navy		Marine Corps		Air Force	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age (years)	27.9	5.9	24.9	4.5	25.9	5.4	28.1	5.6
Weight (kg.)	51.1	5.9	50.1	5.4	51.9	5.8	51.4	7.0
Stature (cm.)	159.9	5.4	160.9	4.9	161.8	5.8	161.5	5.3
Chest Circum.(cm.)	81.1	4.2	80.6	4.2	81.6	4.2	81.0	4.7
Number of Men	1225		299		301		304	

The large Army sample of 1,225 men measured during the survey included personnel of the Airborne Brigade, the 5th and 7th Infantry Divisions, and basic trainees. A summary of the statistical values for the different groups in the Army sample is given in Table 5.2.

Table 5.2. Statistical Values for Army Personnel

	Airborne		5th Inf.Div.		7th Inf.Div.		Trainees	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Age (years)	28.7	4.9	29.1	6.7	29.3	5.9	22.8	1.9
Weight (kg.)	52.7	5.6	51.0	5.7	50.4	6.7	49.3	4.6
Stature (cm.)	160.1	5.0	160.2	5.4	159.7	6.3	158.9	5.1
Chest Circum.(cm.)	82.2	4.0	81.0	4.2	80.6	4.6	80.0	3.6
Number of Men	401		303		306		215	

As might be expected, the basic trainees had the lowest mean age. This group of young men, with an average age of 22.8 years, was about six years younger than the other Army samples. The Army Airborne and Infantry groups had an average age of about 29 years, which is higher than the mean ages of the other services. The basic trainees also were lighter and shorter on the average than other Army personnel. The Airborne troops averaged about two kilograms heavier than infantry personnel. Airborne and 5th Infantry Division personnel had about the same average stature, while 7th Infantry Division troops were slightly shorter.

b. Geographical Differences

Of the total series of 2,129 military personnel measured during the survey in Vietnam, 1,421 men, or 66.7 percent, were born in the Republic of Vietnam or South Vietnam, while 669 men, or 31.4 percent, were born in the provinces of what is now North Vietnam. Twelve men (0.6 percent) were foreign born; birthplace was not recorded for 27 men (1.3 percent).

Since it has been reported that northern Vietnamese are two inches taller and 15 pounds heavier than southern Vietnamese, it is of some interest to examine the relevant data from the present survey. The statistical values for men born in South and North Vietnam respectively are shown in Table 5.3. Although there is a difference of about four years in the mean ages of the two groups, there is practically no difference in their mean statures: 160.5 cm. (63.19 inches) for southern Vietnamese and 160.3 cm. (63.11 inches) for northern Vietnamese. The southern Vietnamese group, with a mean weight of 51.4 kilograms (113.1 pounds), is slightly heavier than the northern Vietnamese sample, whose mean weight is 50.6 kilograms (111.3 pounds). The southern Vietnamese also are slightly larger in chest girth (81.2 cm. or 32.0 inches) than the northern Vietnamese (80.8 cm. or 31.8 inches). The

data from the present survey indicate, therefore, that men born in South Vietnam are only slightly heavier but of the same height on the average as those born in North Vietnam.

Table 5.3. Statistical Values for Southern and Northern Vietnamese

	Southern Vietnamese			Northern Vietnamese		
	Mean	S.D.	V(%)	Mean	S.D.	V(%)
Age (years)	26.0	5.1	19.7	29.9	5.9	19.8
Weight (kg.)	51.4	5.9	11.5	50.6	6.2	12.2
Stature (cm.)	160.5	5.4	3.4	160.3	5.5	3.5
Chest Circum.(cm.)	81.2	4.1	5.1	80.8	4.6	5.7
Number of Men	1421			669		

c. Age Changes in Weight and Stature

When the data of an anthropometric survey are sufficient to warrant such analysis, it is of interest to examine any changes in weight and height in a population with increasing age. Means and standard deviations for the weight and stature of Vietnamese military personnel have been calculated for age groups between 19 and 39 years, as shown in Table 5.4.

The minimum mean weight in this age series is 49.0 kilograms for 19 year-old men, while maximum mean weight is 53.2 kilograms at age 34 years. There appears to be a very gradual increase in mean weight with increasing age in Vietnamese military personnel, but the increase is not as marked as that found in American military personnel.

The mean values for stature are relatively constant between the ages of 23 and 35 years, while means of stature for ages below 23 and above 35 show some variations. These data then do not indicate any gradual increase in mean stature with increasing age in Vietnamese military personnel.

Table 5.4. Mean Weight and Stature of Vietnamese Military Personnel by Age

Age (yrs)	Number	Weight (kg.)			Stature (cm.)		
		Mean	S.D.	V(%)	Mean	S.D.	V(%)
19	32	49.0	4.2	8.6	161.0	4.6	2.8
20	102	50.1	4.9	9.8	161.8	5.0	3.1
21	288	50.3	4.9	9.7	159.8	5.2	3.2
22	234	50.6	5.2	10.3	161.2	5.7	3.5
23	182	50.8	5.1	10.0	160.3	5.0	3.1
24	128	51.4	4.9	9.5	160.8	5.4	3.4
25	104	49.7	5.6	11.3	160.7	5.5	3.4
26	151	50.2	5.6	11.2	160.7	5.4	3.4
27	95	50.5	5.5	10.9	160.4	5.0	3.1
28	85	51.1	6.4	12.5	160.4	6.1	3.8
29	83	51.8	6.2	12.0	160.7	6.2	3.8
30	104	51.4	7.8	15.2	160.8	6.0	3.7
31	83	52.1	7.4	14.2	160.8	5.5	3.4
32	74	51.4	6.5	12.6	160.8	5.4	3.4
33	80	52.5	6.5	12.4	160.8	5.2	3.2
34	55	53.2	7.5	14.1	161.1	5.8	3.6
35	44	52.1	7.4	14.2	161.1	6.4	4.0
36	49	52.2	7.6	14.6	160.2	5.1	3.2
37	39	52.5	6.4	12.2	159.6	4.7	2.9
38	28	52.6	6.8	12.9	161.9	5.7	3.5
39	30	50.0	6.6	13.2	159.0	5.1	3.2

d. Related Anthropometric Data

In any anthropometric survey, questions relating to the representation of the samples of men measured or to the reliability of the data may be raised. In the case of military personnel in Vietnam, supplementary data are available which tend to corroborate the results of the present anthropometric survey.

Through the courtesy of the Republic of Vietnam Army Medical Corps, data on age, weight, stature and chest circumference for a series of 2000 Army personnel were made available. This series consisted of 1000 cadets or officer candidates, who were in training in Courses 12 and 13 at the Thu Duc Military School, and 1000 enlisted men or basic trainees who were in training at the Quang Trung Basic Training Center in 1962.

Statistical values for the series of 2000 men are given in Table 5.5. Although the cadets are one year older on the average than the trainees, the distribution of age differs somewhat in the two groups. The range of age is similar for both groups (20 to 42 years) but 26 percent of the cadets were 28 and 29 years old, while 24 percent of the trainees were 21 years old. The cadets are comparable in age to Army personnel measured in the anthropometric survey, but the trainees are about five years older than the trainees of the anthropometric survey.

The cadets are about one kilogram heavier in weight than the trainees. In comparison with the results of the anthropometric survey, the cadets are approximately two kilograms lighter than Army personnel, while the trainees are less than one kilogram lighter than the trainees measured in the survey. The cadets are 2.8 centimeters taller than the trainees. The cadets also are about 2.5 centimeters taller than Army personnel measured in the anthropometric survey, while the trainees are about one centimeter taller than the anthropometric survey trainees.

These data indicate that while Vietnamese Army personnel measured by the Medical Corps in 1962 were slightly lighter in average weight and slightly taller in average height than Army personnel measured in the anthropometric survey of 1963, there is generally good agreement between the data from the two sources.

Table 5.5. Statistical Values for Cadets and Basic Trainees

	Cadets			Basic Trainees		
	Mean	S.D.	V(%)	Mean	S.D.	V(%)
Age (years)	28.7	3.6	12.5	27.7	5.3	19.1
Weight (kg.)	49.7	7.6	15.3	48.6	4.8	9.9
Stature (cm.)	162.5	5.4	3.3	159.7	5.3	3.3
Chest Circum.(cm.)	80.8	5.5	6.8	80.7	3.8	4.7
Number of Men	1000			1000		

e. Nutrition Survey of Vietnam

Between October and December 1959, a nutrition survey was conducted in the Republic of Vietnam by a joint Vietnamese-American team under the sponsorship of the Interdepartmental Committee on Nutrition for National Defense of the United States Department of Defense. The report on this survey was published in July, 1960.

During the survey, clinical and nutritional studies were carried out on a series of 2,820 Army, Navy and Air Force personnel at 15 military installations in the Republic of Vietnam.

A summary of the pertinent data from the anthropometric and nutrition surveys of the Republic of Vietnam is given in Table 5.6. In the total series (combined services), Vietnamese military personnel measured in the anthropometric survey averaged 1.3 years older and one centimeter (0.4 inches) taller, but 0.3 kilograms (0.14 pounds) lighter in weight than personnel measured during the nutrition survey. On the average, members of the various Armed Forces were consistently older, taller and lighter in the anthropometric survey than in the nutrition survey, with the single exception of stature in the case of Air Force personnel. However, the differences in means are very small, and there is good agreement between the data from the two surveys.

Table 5.6. Anthropometric and Nutrition Surveys of Vietnam: Means of Age, Weight and Stature

	Number	Age(yrs.)	Weight(kg.)	Stature(cm.)
Anthropometric Survey(1963):				
Army	1225	27.9	51.1	159.9
Navy	299	24.9	50.1	160.9
Marine Corps	301	25.9	51.9	161.8
Air Force	304	28.1	51.4	161.5
Total Series	2129	26.8	51.1	160.5
Nutrition Survey(1959):				
Army	2368	25.7	51.4	159.0
Navy	253	24.0	50.2	160.8
Air Force	199	25.0	52.7	161.8
Total Series	2820	25.5	51.4	159.5

f. Related Anthropometry of Other Countries

Since data on the height and weight of Vietnamese military personnel are now available from both anthropometric and nutrition surveys, it is of some interest to compare these values with similar data for samples of military personnel of other Asian countries. Means of weight and stature for various Asian countries are given in Table 5.7, together with the mean ages of the samples measured. An anthropometric survey of military personnel in Thailand was conducted in 1962, under the sponsorship of ARPA, while a nutrition survey was carried out there in 1960. Nutrition surveys also were conducted between 1956 and 1961 in Pakistan, Burma, The Philippines, The Republic of China (Taiwan) and The Republic of Korea, all under the sponsorship of the United States Interdepartmental Committee on Nutrition for National Defense. The data shown in Table 5.7 have been abstracted from the reports of these nutrition surveys.

The data of Table 5.7 indicate that Vietnamese military personnel are lighter and shorter in average weight and height than military personnel of other Asian countries for which information is available. The Vietnamese are about four kilograms (nine pounds) lighter and three centimeters (1.2 inches) shorter on the average than Thai military personnel.

Table 5.7. Means of Age, Weight and Stature for Various Asian Countries

Country	Date	Number	Age (yrs.)	Weight (kg.)	Stature (cm.)
Republic of Vietnam:					
Anthropometric Survey	1963	2,129	26.8	51.1	160.5
Nutrition Survey	1959	2,820	25.5	51.4	159.5
Thailand:					
Anthropometric Survey	1962	2,950	24	56.3	163.4
Nutrition Survey	1960	4,325	22	55.4	163.0
Nutrition Surveys:					
Union of Burma	1961	4,956	26.5	52.9	163.0
Philippines	1957	4,234	30	55.5	162.6
Republic of China	1960	3,894	28.5	55.4	164.3
Republic of Korea	1956	1,514	25	58.9	164.1
Pakistan	1956	2,019	25.6	58.6	170.0

6. HUMAN FACTORS IMPLICATIONS OF THE DATA

a. Human Engineering

The anthropometric data presented in this report should receive wide use and application in the human engineering of equipment for Vietnamese military personnel. The utilization of information on the body size of Vietnamese military personnel will be an important factor in improving the efficiency and performance of Vietnamese man-equipment systems.

Detailed sizing and space requirements for military equipment intended for use by the Republic of Vietnam Armed Forces may be developed from the body size data of this report. The specific information required will vary with the design problem under consideration, but most of the basic requirements with respect to body size are included within the 51 body dimensions taken during the survey.

Many human engineering problems in design, sizing and adjustability involve the spatial requirements of the seated operator. Data on sitting height, eye height, shoulder height and knee height, as well as shoulder and hip breadths, are required for the seated operator. Also of importance in this category are the arm reach measurements.

In considering the use of American equipment by the Vietnamese Armed Forces, some of the differences in body size between Vietnamese and U. S. military personnel may be noted. The average weight of Vietnamese military personnel is 51.1 kilograms (112 pounds), while U. S. Army men average 70.4 kilograms (155 pounds). The difference of about 43 pounds in average body weight is of considerable importance with respect to the weight to be carried by the individual soldier. If it is assumed that the soldier's load should not exceed one-third of his body weight, it is apparent that the American soldier could carry about 23 kilograms, or 50 pounds, on the average, whereas the Vietnamese soldier should be limited to about 17 kilograms, or 37 pounds. The light body weight of Vietnamese is emphasized by the fact that the 50th percentile value for weight of Vietnamese is less than the 1st percentile value of weight for U. S. soldiers.

The average height of Vietnamese military personnel is 160.5 centimeters (63.2 inches); this value is equivalent to the 2nd percentile of U. S. Army stature. In other words, barely two percent

of U. S. Army men are shorter than the average Vietnamese, while 98 percent are taller. The average height of U. S. Army men is 174.0 centimeters (68.5 inches); thus, the American soldier is about 13.5 centimeters (5.3 inches) taller on the average than the Vietnamese serviceman.

The difference in stature between American and Vietnamese military personnel is also reflected in the differences in other body proportions. The Vietnamese soldier has a shorter torso and shorter arms and legs than the American. These differences become important in human engineering considerations, since it is obvious that in operating American equipment, the Vietnamese cannot reach as far with his hands or his feet as the American.

Body girth and body breadth measurements are considerably smaller for Vietnamese military personnel. Items of personal equipment intended for use by Vietnamese, such as load-carrying suspenders and belts or parachute harnesses, must be capable of adjustment to accommodate these smaller girths.

b. Clothing

Detailed analyses of the size systems for military clothing currently in use by the Republic of Vietnam Armed Forces are not available as yet and an assessment of the adequacy of such size systems with respect to the anthropometric data of this report will not be attempted here. However, some general comments may be made on the ranges of available Vietnamese body measurements in terms of clothing sizes.

The overall range of stature, among Vietnamese military personnel, is some 25 centimeters. If clothing is sized in three lengths, each length would be required to fit men with a range of about 9 centimeters in height. With four lengths of clothing, the range of stature for each length would be reduced to about 6.5 centimeters. An additional body measurement of use in considering the lengths of upper body clothing is back waist length, which is measured from the base of the neck to the waist level. The range of this measurement is 12 centimeters; thus each of three lengths would be required to fit a range of about four centimeters in back-waist length.

The overall range of chest circumference among Vietnamese military personnel is 21 centimeters. Thus, with three girth sizes of upper body clothing, each size would be required to fit a range of seven centimeters of chest girth. Neck circumference and sleeve

length are utilized in the sizing of shirts. The range of neck circumference in this series is 7.7 centimeters, while the range of sleeve length is 16.2 centimeters.

Waist circumference and crotch height (or inseam) are the two body measurements controlling the sizing of trousers. The overall range of waist circumference among Vietnamese military personnel is 26 centimeters. With three waist sizes of trousers, each size would be required to fit a range of about nine centimeters in waist girth. With four sizes, the waist girth range for each size would be reduced to 6.5 centimeters. The range of the crotch height or inseam measurement is 18.8 centimeters. Therefore, each of three trouser inseam lengths would be required to fit a range of 6.3 centimeters in inseam.

The range of head circumference may be used for the sizing of headwear. Head circumference among Vietnamese military personnel covers a range of 6.8 centimeters.

The overall range of foot length among Vietnamese military personnel is about 4.7 centimeters, while the range of foot breadth is 2.9 centimeters. In general, the Vietnamese foot is short and broad. The hands of the Vietnamese soldier also are relatively short and broad.

In conclusion, it is obvious that only a few of the human factors implications of the anthropometric survey of the Republic of Vietnam have been suggested. The application of the information on body sizes of Vietnamese military personnel will involve research and development efforts covering several years. A start has been made, however, and data on the range and variation in body size in the military population of Vietnam are now available for use.

7. SUMMARY

During an anthropometric survey of military personnel of the Republic of Vietnam, 51 body measurements were made on 2,129 members of the Armed Forces. The series included a large Army sample, as well as samples from the Navy, Marine Corps and Air Force. The Army sample consisted of airborne and infantry personnel, and basic trainees. The resulting anthropometric data have been analyzed and are available for application in size systems for clothing and personal equipment and in the human engineering of man-operated equipment for the military population of the Republic of Vietnam.

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APPENDIX A

Số thứ-tự
Number

PHIẾU KHẢO SÁT NHÂN TRẮC

ANTHROPOMETRIC SURVEY DATA SHEET

- 8 -

Địa điểm :
Location

Ngày tháng :
Date

Họ và tên :
Name

Số quân :
Serial No

Sinh quán (tỉnh) :
Birthplace (province)

Trú quán (tỉnh) :
Home (province)

Chủng-tộc :
Ethnic derivation

Tôn-giáo :
Religion

Tuổi và
ngày tháng năm sinh :
Age and date of birth

Quân chủng và
Binh chủng :
Service and branch

Đơn vị :
Unit

Cấp bậc :
Rank

Chuyên-môn quân-sự
hay chức-vụ :
Military specialty
or duty

Thâm niên
quân vụ :
Length
of service

0 0

[F)7 HAN-TRAC-DINH
ANTHROPOMETRIC MEASUREMENTS

So thu-tu
Number

1. Can nang Weight	0		
2. Chieu cao Height	1		
3. Chieu cao ngang vai Shoulder height	1		
4. Ch.cao ng.th.lung Waist height			
5. Ch.cao ngang hang Crotch height			
6. Ch.cao ngang dau goi Kneecap height			
7. Tay dua th.len troi Arm reach upward	1		
8. Chieu cao ngoi Sitting height			
9. Ch.cao ngang mat, ngoi Eye height, sitting			
10. Ch.cao ngang vai, ngoi Shoulder height			
11. Ch.cao ngang goi, ngoi Knee height, sitting			
12. Ch.cao toi khuyu chan, ngoi. Popliteal height			
13. Be ngang hong, cung Hip breadth, standing			
14. Tay dua thg. fia truoc Arm reach forward			
15. Ch.dai tu mong toi goi Buttock-knee length			
16. Ch.dai:mong-khuyu chan Buttock-popliteal length			
17. Be ngang vai Shoulder breadth			
18. Be ngang hong, ngoi Hip breadth, sitting			
19. Chieu cao dau Head height			
20. Chieu dai:vai-cui-cho Shoulder-elbow length			
21. Ch.dai: cuicho-hobantay Forearm-hand length			
22. Chieu dai ban chan Foot length			
23. Ch.dai long ban chan Instep length			
24. Be rong ban chan Foot breadth			
25. Be rong got chan Heel breadth	0		
26. Chieu dai ban tay Hand length			

27. Ch.dai long ban tay Palm length			
28. Be rong ban tay Hand breadth	0		
29. Chieu dai khuon mat Face length			
30. Khg.cach 2 trong mat Interpupillary distance	0		
31. Be ngang khuon mat Face breadth			
32. Be ngang dau Head breadth			
33. Chieu dai dau Head length			
34. Vong dau Head circumference			
35. Vong co Neck circumference			
36. Vong vai Shoulder circumf.			
37. Vong nguc Chest circumf.			
38. Vong that lung Waist circumf.			
39. Vong hang Hip circumference			
40. Vong canh tay tren Upper arm circumf.			
41. Vong co tay Waist circumference			
42. Chieu dai dg.may tay ao Sleeve inseam			
43. Be ng.lung phia tren Interscye breadth			
44. Ch.dai: duoigay-th.lung Back waist length			
45. Chieu dai tay ao Sleeve length			
46. Vong dui sat hang Crotch thigh circumf.			
47. Vong dui phia duoi Lower thigh circumf.			
48. Vong bap chan Calf circumference			
49. Vong co chan Ankle circumference			
50. Vong cheo:got-mat ca Heel-ankle diagonal			
51. Vong ban chan(cho rong) Ball foot circumference			

APPENDIX B

Instructions for Anthropometric Measurements

STATION #1

Preliminary: Fill in background information on front of data sheet according to instructions.

1. Weight. Weigh man and record his weight to nearest kilogram.

STATION #2

Measurements 2 through 12 will be made with an anthropometer. Total of 11 measurements.

A - Man standing on the floor:

2. Height. With the man standing erect, measure from the floor to the top of his head.

3. Shoulder Height. With the man standing erect, measure from the floor to the outer point of his right shoulder.

4. Waist height. Measure from the floor to the top of his right hip bone (the level at the waist where the trousers normally are worn).

5. Crotch height. Measure from the floor to the crotch.

6. Kneecap height. Measure from the floor to the top of the right kneecap.

B - Man sitting on a table or bench with his feet on a box so that his knees are at right angles:

7. Arm reach upward. With the man sitting and with his right arm extended above his shoulder, measure from the seat to the tip of the middle finger in his extended hand.

8. Sitting height. With the man sitting erect, measure from the seat to the top of his head.

9. Eye height, sitting. With the man sitting, measure from the seat to the level of his right eye (at the inner corner of the eye).

10. Shoulder height, sitting. With the man sitting, measure from the seat to the outer point of his right shoulder.

11. Knee height, sitting. With the man sitting and with his knees at right angles (foot rest should be adjusted), measure from the foot rest to the top of his right knee.

12. Popliteal height. With the man sitting and with his knees at right angles (foot rest should be adjusted), measure from the foot rest to the underside of the right knee.

STATION #3

Measurements 13 through 21 will be made with a large sliding caliper (top two sections of anthropometer). Total of 9 measurements.

A - Man standing on the floor:

13. Hip breadth, standing. With the man standing, measure the maximum breadth across the hips.

B - Man sitting on a table or bench:

14. Arm reach forward: With the man sitting and with his right arm extended horizontally in front of him, measure from the back of the shoulder to the tip of the middle finger in his extended hand.

15. Buttock-knee length. With the man sitting and with his knees at right angles, measure from the back of his hip to the front of his right knee.

16. Buttock-popliteal length. With the man sitting and with his knees at right angles, measure from the back of his hip to the back of his right knee.

17. Shoulder breadth. With the man sitting, measure the maximum breadth across the shoulders, including both arms.

18. Hip breadth, sitting. With the man sitting, measure the maximum breadth across the hips.

19. Head height. With the man sitting, measure from the notch at the front of the right ear to the top of the head.

20. Shoulder-elbow length. With the man sitting and with his right arm held so that it forms a right angle at the elbow, measure from the point of the shoulder to the elbow.

21. Forearm-hand length. With the man sitting and with his right arm held so that it forms a right angle at the elbow, measure from the elbow to the tip of the middle finger in his extended hand.

STATION #4

Measurements 22 through 24 will be made with a foot box; measurements 25 through 30 will be made with small sliding calipers; and measurements 31 through 33 will be made with small spreading calipers. Total of 12 measurements.

A - Man standing on the floor with his right foot in the foot box, and his weight distributed on both feet:

22. Foot length. Measure the maximum length of the right foot, from the heel to the tip of the longest toe.

23. Instep length. Measure the length of the instep from the heel to the inner ball of the foot.

24. Foot breadth. Measure the maximum breadth of the right foot.

B - Remove foot box; man remains standing:

25. Heel breadth. Measure the maximum breadth of the right heel behind and below the projections of the ankle bones.

C - Man sitting on a chair:

26. Hand length. With the man's right hand extended, and with the palm up and the fingers straight, measure the length of the hand from the wrist to the tip of the middle finger.

27. Palm length. With the man's right hand extended, and with the palm up and the fingers straight, measure from the wrist to the base of the middle finger.

28. Hand breadth. With the man's right hand extended and with the palm up, measure the maximum breadth across the base of the fingers.

29. Face length. Measure the length of the face from the root of the nose (depression between the eyes) to the tip of the chin.

30. Interpupillary distance. Measure the distance between the centers (pupils) of the eyes.

31. Face breadth. Measure the maximum breadth of the face between the cheek bones.

32. Head breadth. Measure the maximum breadth of the head (usually found above and behind the ears).

33. Head length. Measure the maximum length of the head, from the forehead (slightly above the eyes) to the back of the head.

STATION #5

Measurements 34 through 51 will be made with a steel tape. Total of 18 measurements.

A - Man standing on the floor:

34. Head circumference. Measure the maximum circumference of the head, with the tape passing over the forehead and just above both ears.

35. Neck circumference. Measure the circumference of the neck, with the tape passing just below the thyroid cartilage or "Adam's apple".

36. Shoulder circumference. Measure the maximum circumference of the shoulders, with the tape passing over the bulge of the deltoid muscles in both upper arms.

37. Chest circumference. With the man's arms raised, place the tape in position around the chest; then with the arms lowered, measure the circumference of the chest at the level of the nipples, during normal breathing.

38. Waist circumference. Measure the circumference of the waist at the level of the umbilicus, with the abdomen relaxed.

39. Hip circumference. Measure the maximum circumference of the hips at the level of the greatest protrusion of the buttocks.

40. Upper arm circumference. Measure the circumference of the right upper arm at the level of the biceps muscle, midway between the shoulder and the elbow (arm is relaxed, not flexed).

41. Wrist circumference. Measure the minimum circumference of the right wrist.

42. Sleeve inseam. With the right arm extended and held away from the body, measure from the front edge of the armpit along the arm to the wrist.

43. Interscye breadth. Measure the distance across the back between the creases of the armpits.

44. Back waist length. Measure the distance along the back from the base of the neck to the level of the waist.

45. Sleeve length. With the man's arms held horizontally and his fists pressed together, measure from the middle of the back, over the right elbow to the wrist, with the tape held horizontally.

B - Man standing on a box or bench:

46. Crotch-thigh circumference. Measure the circumference of the right upper thigh, with the tape passing below the gluteal furrow.

47. Lower thigh circumference. Measure the circumference of the right lower thigh with the tape passing just above the kneecap.

48. Calf circumference. Measure the maximum circumference of the right calf.

49. Ankle circumference. Measure the minimum circumference of the right ankle, with the tape passing just above the projections of the ankle bones.

50. Heel-ankle diagonal. Measure the diagonal circumference around the right ankle, with the tape passing under the heel and over the instep at the junction of the foot and the leg.

51. Ball foot circumference. With the front part of the man's right foot slightly raised, place the tape under the foot; then measure the maximum circumference of the foot at its widest point. The man should be standing with the feet slightly apart and with his weight distributed on both feet.